HOW UNCLE SAM FIGHTS.

COMMODORE DEWEY.

HOW UNCLE SAM FIGHTS;

OR,

Modern Warfare---How Conducted.

EDITED BY
GENERAL A. C. PARKERSON.
ASSISTED BY
MILITARY AND NAVAL EXPERTS.

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HOW UNCLE SAM FIGHTS.

CHAPTER I.

LIFE OF NAVAL APPRENTICES.

HOW BOYS ARE TRAINED TO MAN OUR WARSHIPS—SERVICE ON SHORE AND AT SEA.

There is a period in the physical and mental development of the average lad, irrespective of nationality, in which his inherent taste for adventuresome activity in one form or another is bound to be asserted. In a majority of instances this volatile propensity assumes a nomadic nature, and, although characteristically transitory, its proportions are generally of sufficient magnitude to arouse more or less apprehension in the minds of his immediate guardians. The custom observed by certain nations of the Old World, requiring each youth of the land to pass the last few years of his minority in the military service of his country, invariably results in the elimination of whatever Bohemian ideas his industrious young brain may previously have conceived, and enables him thereafter to complacently settle down to the hackneyed pursuits of life. But with the American boy it is different; the government does not exact of him a martial education, and for the want of an opportunity of embodying his youthful fancies into action, he resigns himself to alternating with the clandestine perusal of such demoralizing, yellow-back literature as he can acquire. and dreaming of the realms of eventfulness which he firmly believes to lie just beyond the confines of the parental reservation. The prudence of forcibly quenching the disposition of the juvenile ambition to indulge in a measure its venturesome inclinations is decidedly questionable, and not a few who have graduated from a prosaic youth into manhood's ubiquitous

alumni are disposed to recall with vain regret the unfulfilled yearnings of their boyish minds.

While there is no demand on the part of the United States Government that its future citizens shall serve a probationary course in any of its military organizations, it has, in recent times, opened up an avenue of emancipation for the restless masculine element of immature years, whereby the deficiencies of commonplace boyhood life are abundantly provided for. The Utopia in question is the government training school for naval apprentices. The system of receiving boys as apprentices in the naval service dates back to 1837, eight years prior to the establishment of the naval academy at Annapolis. Upon that occasion Congress authorized the enlistment of a limited number of lads between the ages of thirteen and eighteen years to serve until they should attain their majority, with the object of fitting them for general service in the navy. The impression, however, became current that these apprentices were eventually to become midshipmen, with the result that many boys from the best families became identified with the new departure, but when it subsequently developed that, with a very few exceptions, the lads were ineligible to positions which would place them in the line of promotion, there immediately followed a clamor for discharges, which, with a little influential pressure, were generally forthcoming, and, after a brief existence, the movement was abandoned.

A few years afterwards the project was again revived, and a provision made that one-half of the midshipmen of the navy should be appointed from the apprentices. The consequence was very similar to that of the first attempt, a majority of the apprentices representing families of wealth and distinction. many of them resorting to this opportunity of securing an office in the service after having failed at the naval academy, the result being that after the first few midshipmen had been selected from their number the remainder became discontented, another stampede for discharges ensued, and for a second time the experiment was declared a failure.

But in 1857 the deplorable character of the men comprising the crews of vessels of the navy, a large percentage of whom

were foreigners who in many instances could neither speak nor understand English, impelled the Navy Department to inaugurate the system now in use of training apprentices for service as sailors on board men-of-war. The following extracts from the revised statutes clearly set forth the object of the provision:

"Boys between the ages of fifteen and eighteen years may be enlisted to serve in the navy until they shall arrive at the age of twenty-one years. * * * The prime object is to place in the naval service, with the consent of their parents, such good and deserving boys as will elevate its standard and make the navy more reliable as an arm of the national defence."

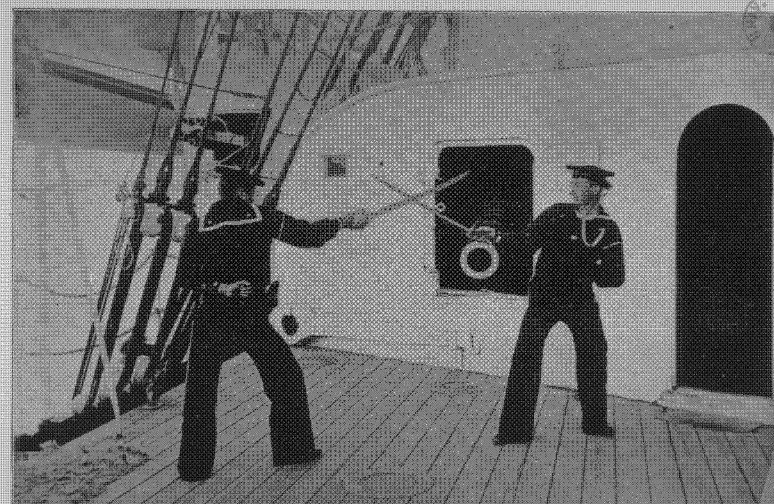
Thus it will be seen that only boys of good moral character and those having the full consent of their parents or guardians are eligible to apprenticeship in the naval service. Applicants are examined at various recruiting rendezvous on the Atlantic coast, but principally on board the Minnesota at New York and on the Michigan at Erie, Pa. When residing at a distance the applicant is furnished, upon request, with a blank form, which may be filled out by his parents or guardian, granting the required consent, and, armed with this document, he proceeds alone to his destination, and, having located the receiving ship, goes on board and presents himself to the officer-of-the-deck. This personage in turn takes him before the executive officer, who examines his certificate and questions him rigidly concerning his full name, correct age and motive for desiring to enter the service. Having accounted for himself satisfactorily, he is next turned over to the surgeon of the ship, who requires him to strip to the skin, after which he is given a thorough physical examination, his eyesight carefully tested and his measurements taken. If between fifteen and sixteen years of age he must be at least five feet in height, twenty-eight inches around the chest and weigh eighty-five pounds, and if older his requisite proportions increase in accordance with his years. It is remarkable how few are the boys who attain to the high physical standing exacted by the regulations, the most prevalent defects being with the eyes, although the

seeds of many an ill, hitherto undreamed of, are found to have been sown in the youthful anatomy.

The various examinations passed, the successful candidate is again ushered into the presence of the executive officer, by whom he is pledged to faithfully serve under the United States flag until he becomes of age, unless sooner discharged from unforeseen causes. He then signs his name to the articles and is next turned over to the pay-yoeman, who provides him with an outfit to the value of $45 and which consists of a hammock, mattress and blankets, in which he will hereafter dream away the hours of his watch below, three blue and white naval uniforms, a black silk neckerchief, white laniard with knife attached, low-cut shoes, flannel underclothing, blacking kit, whisk broom, tooth brush, towels and soap, all of which miscellaneous effects are piled in the middle of the deck before the bewildered lad.

Meanwhile word has been passed from one to another of his future companions throughout the ship that a new recruit is being initiated, and presently he is surrounded by a score or two of mischievous youngsters of somewhere about his own age, who proceed to banter him with all sorts of drollery, one of them gravely inquiring as to how things are progressing on the farm, while another, after running his eye over his newly-acquired outfit, informs him with apparent concern that the paymaster has neglected to provide him with a hammock ladder. Finally the "jack-o'-the-dust" comes to his rescue with a large white canvas bag, which will hereafter serve him as a trunk, and in which he is instructed how to stow away his spare articles of clothing, and a neat wooden ditty box designed to contain his small gear. This worthy next shows him how to lash his hammock with a neat roll and stow it in the nettings, and then turns him over to the boatswain's mate, who conducts him about the ship, explains its various parts to him, shows him what mess he will eat with, etc.

The numerous ordeals through which he passes during the day and the strangeness of his surroundings are very apt to have a depressing effect on his spirits, and by the time hammocks are piped in the evening, and he is tucked away



FENCING DRILL.

in its snowy folds, he is ready to cry from genuine homesickness. But his vacillating bed gradually lulls him into a peaceful sleep, to dream of familiar scenes, wherein he once more follows the lowing herd through green meadow lands, which now appear strangely beautiful to him, and of quiet fireside associations which never seemed attractive until now that he has left them behind.

The newly-enlisted apprentice does not remain long on board the receiving ship, but is sent, in company with other of his mates, to the training station at Coaster's Island, near Newport, R. I. Here he is put through a course of instruction for a period of six months or longer, according to his aptitude, preparatory to his assignment to one of the training ships of the navy. During this interval, and until he merits promotion to a higher rating, his pay is $9 per month, in addition to which he is allowed one ration for his subsistence.

His course at the training station marks one of the most pleasant epochs in his new calling, and, although he is constantly looking forward to the time when he will be sent to sea, its pleasurable environments will ever afterward dwell in his memory. His instructions consist of three branches, viz., seamanship, gunnery and English, the latter comprising the several elements of reading, writing, spelling, geography, history and arithmetic. Fencing and boxing are also taught, in order that he may know how to handle himself at close quarters. There is a spacious parade ground at Coaster's Island, and every day, in fine weather, it presents an animated scene. Should the lesson be in gunnery, the classes are divided into gun's crews under the supervision of a schoolmaster, who is an ex-apprentice, appointed to his position upon re-entering the navy after his term of service had expired, and all the intricate maneuvers are gone through with precisely as though performed by a detachment of regular artillery. If it be infantry drill the whole school assembles under arms in battalion formation, and, headed by the band, displays a very martial appearance in its execution of the various field movements and tactics.

The instructions in seamanship at Coaster's Island consist

principally of knotting and splicing, boxing the compass, heaving the lead and measuring the logline, its more practical features being reserved for the advanced grades. In the evening, between supper and hammocks, and on Saturday afternoons, the apprentice is allowed the freedom of the island, and with boat-racing, football and kindred sports, and an occasional visit to Newport, he develops both mentally and physically with a rapidity that is truly surprising. On Sundays divine services of a non-sectarian order are conducted in the chapel, which ceremony a number of kindly-disposed ladies are always interested in making attractive.

Twice in each year, with the commencement of summer and the setting in of winter, there appear at the island one or more of the training ships of the navy, and, together with such other boys as are qualified, from a standard of general progress and good conduct, he is taken on board for a cruise, which during the warm months is passed in European waters, and in the cold season extends to the West Indies.

From that time on his education assumes an entirely different phase, and while the theoretical studies are still continued, he is taught to go aloft and handle sail, to reef and furl, to send up spars and cross yards, to signal and to steer. The crew of the vessel is divided into two watches; if assigned to the starboard watch he wears about his right arm, near the shoulder, a narrow strip of white tape, and if to the port watch, the same mark about his left arm. While at sea he spends alternately four hours on duty and four below. During his watch on deck he takes his turn at the lea-wheel and at the lookout from the masthead. In port his day's duty is distinguished somewhat by routine. At 5.30 in the morning the bugle sounds early reveille, and he is allowed eight minutes in which to dress himself, lash his hammock, scramble up the ladder to the spar deck and deliver it to the "captain of the top," who stows it in the netting, and he hasn't a second to spare, for a late hammock results in his being reported and subsequently punished. He then goes to the galley and gets his cup of hot cocoa and a biscuit, which is designed to stay his stomach until breakfast time. At 6 o'clock the boatswain's

mate's whistle signals all hands to "turn to," and with trousers rolled above his knees he assists in the work of "holy-stoning," scrubbing and washing down decks. At 7.50 the whistles pipe "mess gear," and, while the cooks get down the tables and benches from their brackets overhead, he joins a group of his shipmates who are gathered about a bucket of fresh water, which some one of the most enterprising of their number has purloined from the scuttlebeet, or the galley coppers, for the crew are only allowed fresh water for drinking purposes, and, stripped to the waist, makes his morning toilet. He has barely had time to undergo this process and resume his discarded upper clothing when eight bells strike, and amidst a perfect pandemonium of sounds, such as can only be raised by a crew of hungry sailor boys with appetites sharpened by the exhilarating work of the morning, sits down with his messmates to breakfast.

At 8.30 he again turns to, cleans his share of the gun and deck bright work and lends a hand in getting the ship ready for inspection by the executive officer at 9 o'clock. This inspection, which is but a preliminary to a more rigid one later by the commander, over with, the apprentice hustles himself into his best mustering uniform, which must be spotlessly clean and correspondingly neat, polishes his shoes, and at 9.30 falls in with his division at quarters. Here he answers his name to the roll-call, and stands at attention as the commander passes along the line looking him over, with the rest, in a glance which takes in everything from his shoes to his gilded cap ribbon. After quarters comes the forenoon drill, which on general occasions may consist of broadsword exercise, revolver tactics, the manual of arms or great gun drill.

At noon he is allowed an hour in which to dine and rest from his late exertions, and at 1 o'clock must be ready for more drill, which lasts until 4 o'clock, when the decks are swept down and the remainder of the afternoon until supper time employed at study. The interval between supper at 5.30 and hammocks at 7.30 is devoted to the setting-up exercises, a form of calisthenics, recently introduced into the navy, after which he can skylark, sing and dance with the rest of his

mates until 8.50, when taps are sounded, and he must turn in his hammock and be quiet for the remainder of the night.

While this is an average day on board of a naval training ship, there are not a few which differ widely therefrom. There are special days set apart for special customs. As an example, Friday is almost invariably given over to fire drill and the exercises relating to "abandon ship," while upon other occasions, not necessarily specified, the thorough inspection and airing of bedding and spare clothing take place. Some days will be exclusively devoted to sail and spar drill, while on others all drill will be dispensed with and the crew set to work tarring down the rigging, scraping spars or painting ship.

After two years of instruction, including the period spent at the training station, the apprentice may be assigned to a regular cruiser or battleship of the navy, where, in the course of time, the extent of which varies according to his abilities, he is advanced to the rating of seaman-apprentice, with the pay of $21 per month. He rarely fails to attain to this capacity by the time he becomes of age, when he is at liberty to give up the sea and choose another vocation in life, which opportunity he is usually eager to embrace, for, as a career, the navy holds out but few inducements to the American boy who enters it as an apprentice. True, if he re-enlists, he may become a petty officer, with a salary ranging from $30 to $65 per month, and in rare instances is advanced to the grade of warrant officer, such as boatswain or gunner, at from $1000 to $1800 a year, but above this, whatever may be his capabilities or qualifications, he can never rise. Yet, as a school of experience, wherein the government is amply reimbursed for his education by the years of youthful energy he passes in hard service on board its vessels, and which may well be said to contribute much toward "elevating the standard of the navy," the apprentice system unquestionably possesses its advantages, and the training which enables the boy to brave the gale at sea may likewise fit him, as a man, to weather the fierce monsoons which at one time or another arise in every life.

RECREATION. "JOLLY TARS."

CHAPTER II.

LIFE AT WEST POINT.

FROM REVEILLE TO TAPS AT THE MILITARY ACADEMY—THE MAKING OF OFFICERS FOR THE UNITED STATES ARMY—STRICT DISCIPLINE AND HARD WORK—LOTS OF IT FOR TWELVE HOURS OUT OF TWENTY-FOUR—A PLEASANT FEATURE OF THE LIFE IS ITS DEMOCRATIC EQUALITY—A PLACE WHERE MANLY MEN ARE MADE—THE YOUNG GUARD OF THE REPUBLIC.

There is no place in the country where the prospect of war is more eagerly looked forward to than at West Point. The 300 cadets of the United States Military Academy hope soon to be in the active service of Uncle Sam, and a conflict that required the services of a large number of troops would be welcomed as offering chances for experience and promotion that are slow in coming to the young soldier in time of peace.

If the United States had to raise a volunteer army to fight against Spain or any other country it would be officered chiefly by recent graduates of the West Point institution. Some persons affect to believe that these youngsters, fresh from their studies, would not be fitted for the serious work of war. But those who are familiar with the work required of the army boys at West Point and with the record of the old school in past wars have no such fears.

The same thing was said at the beginning of the Civil War, but when that desperate struggle had been fought and finished the men on both sides who had won rank and fame were those who had been trained at West Point. Grant, Sherman, Sheridan, Lee, Johnston, "Stonewall" Jackson, McClellan, Hooker, Meade, were all West Point men. Among those in the highest ranks were some who went directly from their books to the battlefield.

There is a reason why West Point men are likely to be the leaders in any war that may come to the United States. Discipline, sound health and scientific knowledge are the things that are drilled into the cadet every hour of the day during his four years' stay at this military academy.

From the time of his admission until he graduates he must submit to a daily round of work and discipline more rigorous than is required of any other schoolboy in the country. West Point men become fit to command because they first learn how to obey.

In West Point every action of the day moves with martial step to the command of the bugle. At 6.30 in the morning its shrill notes echo through the silent halls of "barracks" in the reveille with its familiar refrain.

"I can't get 'em up, I can't get 'em up,
I can't get 'em up in the morning."

Simultaneously 300 boys tumble out of bed, hastily thrust themselves into shoes, trousers, coat and cap, and then tumble downstairs into ranks for morning roll-call. No matter how sleepy the cadet may be, or how cold his barren room, there must be no delay, for if he is an instant behind at roll-call his name will be posted on the demerit list, and his tardiness must be made up for by wearisome tramping along the halls with a gun across his shoulder.

As soon as the line is formed the lordly first sergeant steps before the company and calls the roll. He rattles over the seventy or eighty names as fast as his tongue can wag. He never uses the roll-book; the names are firmly fixed in his mind by many repetitions, and he gets through the list in an incredibly short time. Then back go the boys to wash, dress and tidy up their rooms in the half-hour that intervenes before breakfast. The tidying-up process does not take long, for the rooms are bare of all except the necessities.

Each room is shared by two boys, and contain two study tables, three uncomfortable wooden chairs, a wash bowl and stand, two iron cots separated by a low wooden partition.

Against the walls are shelves for books and clothes and a row of iron hooks. That is all. No rugs on the floor, no easy chairs or comfortable pillows or pretty pictures. Everything is ruled by martial simplicity, and every room is the same whether it is occupied by the son of a millionaire or a washwoman's boy.

The two boys who occupy a room take turns in serving as room orderly, each acting for a week at a time. The room orderly must sweep and dust and care for the room, and each man must keep his personal belongings in order. On rising he must carefully fold the bedclothing and mattress at the head of his cot, range his shoes in a regular line on the floor at the foot and hang each article of attire on its special hook before the inspection officer makes his rounds. When that personage appears at the door the two cadets stand at attention while he carefully notes the condition of the room. If there is a speck of dust on the floor, a shoe out of line or a scrap of soiled linen in sight it means demerits for the offender. Personal friendship with the inspection officer will not help the cadet. The officer is "on honor" to make an accurate report, and to put a cadet on his honor is better than to have his oath. Lying is a vice that has no place at West Point.

After inspection comes breakfast, and then there is half an hour for study before recitations begin, at 8 o'clock. From 8 to 1 are recitation and study hours. Each cadet has usually three recitations a day, and the classes are all called and dismissed by bugle. The boys line up and march to the lecture halls in a body and are inspected by the officer of the day before they are dismissed. Between 8 and 1 the cadet cannot leave his room except to go to recitations, and the academic building is as silent as a country churchyard, save when the classes march to or from their rooms.

One o'clock is the dinner hour. The cadets form in line and march down the street to the long, low mess hall, where they take their places at some thirty tables and fall upon the roast beef and other viands with as much vigor as though they were attacking an enemy. Thirty minutes is all the time

allowed for eating, and then they march back to barracks for more study and recitations from 2 until 4.

At 4 o'clock mental labor ends for a time, and fifteen minutes later the roll of the drum calls the cadets to arms and to the field. The next hour is spent on the drill ground if the weather is pleasant, or in the armory if it is not, in going through company drill and instruction on the manual of arms. At the same time the cavalrymen, the third class boys, are going through their evolutions on another part of the field, sitting their horses with easy grace and putting the lively steeds through all their paces.

Drill ends at 5.20, unless it is parade day. In that case the cadets are out again in twenty minutes, having changed to their dress uniforms in the meantime. The band appears, led by the mighty drum-major, and marches across the field before the long line of silent cadets, all standing at parade rest, not the variation of a fraction of an inch in their positions. The blare of martial music, the long plumes of the reviewing officers and the bright red sashes of the officer cadets lend an element of life and color to the dress parade that makes it always an inspiriting sight.

Then, as the sun sinks behind the rugged barrier of the Hudson hills, the boom of the sunset gun echoes across the river, the starry flag comes drifting slowly down from the tall flagpole, and the "Star-Spangled Banner," softly played by the band, floats across the field, while the gray line still stands silently at parade rest, and the enlisted men of the post, who are lounging about on the old cannon, remove their caps in a reverent attitude of attention. It is a daily lesson of honor and respect to the beloved emblem for which scores of brave West Pointers have laid down their lives in the past, a lesson that is not lost on the young men in gray.

Now sharp-spoken orders ring across the field, the line stirs into motion once more, and the men march back to barracks. A brief breathing spell, the one hour of the twenty-four the cadet can call his own, follows before supper.

Half an hour after supper comes the "call to quarters," which means that every man must return to his room and to

SEWING HAMMOCKS.

his study on the morrow's lesson. The sentries make their rounds of inspection and quiet reigns until 9.15, when "tatto" warns the tired youngsters to prepare for bed. Fifteen minutes later the slow roll of "taps" sounds, the lights go out in the old academic building, and sleep assumes the command of the young guard of the republic.

There are no vacations at West Point. Except for a few weeks at the close of the third year the cadet is not allowed a leave of absence during the four years' course. But from the middle of June to the end of August books are laid aside and the boys go into camp in the little grove at one side of the campus. Tent life is always welcome, but it can scarcely be looked upon as a holiday. Reveille sounds at 5.30 in the morning, and every moment of the day is occupied by some military duty. There is troop parade every morning after breakfast, after that the daily guard mount, and then two hours of infantry drill. Then the fourth class men, the plebes, tramp away to Washington Valley and spend an hour in receiving instruction in swimming, the third class men have artillery drill, and the first class, the seniors, have target practice. The afternoon is filled with more drill.

In spite of the Spartan discipline maintained and the unceasing round of drill and study, there is plenty of fun for the cadets. To the boy of athletic tastes the practice in swimming, fencing and riding comes under that head. There are officers' hops twice a week, which bring pretty girls from all along the river, and graduation week is a bright oasis in the year, made gay by a small army of sisters, aunts and cousins, who overflow the place.

One pleasant feature of West Point life is its democratic equality. If a man is a gentleman he stands as well as any of his fellows. Each cadet receives $540 per year from the government. Out of that he must buy his clothes and rations from the commissary department. He is allowed to receive money from outside only in exceptional cases. There can be no difference in dress or style of living, and this spirit of equality, enforced by the rules, is accepted by all the men.

West Point is no place for a young man who has not a

natural aptitude for a military career. To others the stern requirements of the studies, the strict discipline which never relaxes, will become unbearable, and the pile of demerits that he can pick up for "gazing about in ranks," having an "odor of cigarette in his room," or "appearing at parade with soiled gloves" will soon send him back home. Nearly half of those who enter the academy fail for one reason or another to complete the course.

West Point is a place where manly men are made, and the only material for that purpose is found in manly boys. Uncle Sam has no use for any other kind.

CHAPTER III.

RULES TO GOVERN WAR.

THEY HAVE BEEN ADOPTED TO MITIGATE ITS HORRORS—THE RED CROSS AND ITS WORK—THE AGREEMENTS OF THE CONVENTION AT GENEVA—RULES OF NAVAL WARFARE.

What are the rules governing the rights of nations and individuals in modern warfare, and the methods of carrying on war?

One broad principle of modern warfare is that no neutral nation shall give aid of any nature to the combatants. The world is supposed to stand aside and let the belligerents finish their quarrel unaided, and on their own resources. Theoretically, at least, this would be done in the case of war between the United States and Spain.

According to principles of international law, no nation could sell either country any ships, supplies or ammunitions after war had been declared, nor lend either country any money for the purpose of carrying on the war. Neither could any neutral nation allow fighting within her waters, or the landing of troops on her shores for the purpose of transportation, or any other purpose, except they be driven there by stress of weather, or to escape annihilation. Then they should be disarmed or returned over the border.

A leading principle of naval warfare is that the commerce of each contending nation is lawful prey for the other, and in the case of both the United States and Spain, privateers might be fitted out lawfully by either to prey on the merchant vessels of the other.

One of the blessings in the spirit of humanity in modern warfare is the ministration allowed to wounded soldiers, without regard to country or flag, by the members of the Red

Cross Society, who are now classed as non-combatants by every civilized nation on the globe.

A SAFEGUARD.

The red cross, on a white ground, worn on the arm, or appearing on the flag of a hospital corps, is a safeguard to the bearers, who are allowed to minister to the needs of the wounded on the field or within the lines of both contending armies. Even in the savage fighting of the taking of Port Arthur by the Japanese the Red Cross surgeons and nurses were respected and protected wherever they went.

No thought of modern war can come to the mind without being accompanied by a thought of the great good accomplished by the history-making convention of Geneva. The agreement of the convention of Geneva was signed August 22, 1864, by the representatives of France, Switzerland, Belgium, Portugal, Holland, Italy, Spain, Denmark, Baden and Prussia, and the Red Cross Society, so-called because of the symbol of mercy then adopted, became a power in the world.

Its principle was the neutralization and the exemption from the casualties of war of all persons, vehicles and buildings devoted to the care of sick and wounded members of contending armies. The first ten signers of the agreement were quickly followed by others, until now the Red Cross is entrenched in every part of the civilized globe. Every army surgeon and nurse becomes, on taking up his or her duty, a member of the society and a wearer of its symbol.

The articles of the original agreement of the Geneva convention were in substance as follows:

1. No distinction is to be made in nationality in caring for sick and wounded. Natives of an invaded country that bring aid to them shall be free to come and go. If they receive the wounded into their houses they shall be exempt from quartering troops and from military contributions.

2. Ambulances, hospitals and their personnel shall be recognized as neutral, and be marked by a distinctive flag or arm badge. These shall both bear a red cross on a white ground.

President McK'nley. Lyman J. Gage E-Gov. John W. Griggs. Ex-Gov. John D. Long. James Wilson. Cornelius N. Bliss.
John Sherman. General Russell A. Alger. James A. Gary.

PRESIDENT McKINLEY AND HIS CABINET DISCUSSING THE SPANISH DIFFICULTY.

The flag shall be accompanied by a national flag. The material in military hospitals remains subject to the laws of war. When ambulances and hospitals come into the hands of the enemy, attaches may return to their own army with their personal effects. Sick and wounded who come into the power of the enemy, when cured, shall be returned to their own country, if incapable of service. Otherwise they shall be paroled.

These original articles were a few years ago added to in order that they might extend to floating hospitals in use in the navies or in river and harbor engagements.

THREE OTHER CONVENTIONS.

There have been three important conventions besides the Geneva convention in the last half-century, looking toward the codification of the rules of warfare. They are:

The congress of Paris, held in 1856, for the purpose of arriving at an international agreement in regard to privateering and naval warfare.

The convention of St. Petersburg, 1868, in which sixteen nations joined in a declaration relating to the expediency of forbidding the use of certain forms of explosive bullets.

The conference of Brussels, called by the Emperor of Russia in 1874, to prepare the way for the codification of rules governing modern warfare.

The United States was not a party to any one of these conventions. The articles of the declaration of Paris are as follows:

"1. Privateering is and remains abolished.

"2. The neutral flag covers enemy's goods, with the exception of contraband of war.

"3. Neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag.

"4. Blockades, in order to be binding, must be effective—that is to say, maintained by a force sufficient to prevent access to the coast.

"This declaration shall not be binding except on those powers that have acceded or shall accede to it."

The United States and Spain, strangely enough, in the present crisis, are the two chief powers who have not agreed to the whole of this declaration. Mexico is also not a party to it. As between the United States and Spain, it will be seen that in case of war the shipping of either country would be subject to attack by privateers, and the loss might be enormous. The United States recognized all the articles of the Paris declaration except the first.

The St. Petersburg declaration was in substance that the employment of any projectile, weapon or explosive in warfare which might "uselessly aggravate the sufferings of wounded men or render their death inevitable," was contrary to the laws of humanity. It laid down the principle that the object of war is to disable the greatest number possible, but not to render wounds incurable or increase their severity. The use of explosive balls less than 400 grammes (about one pound) in weight was forbidden. The United States is not a party to this declaration, which is reciprocal between the signing parties.

THE BRUSSELS CONFERENCE.

The Brussels conference met without any representative of the United States present. The signing of a general agreement on rules of warfare was frustrated through the disagreement of some of the powers over a clause relating to the right of inhabitants of an invaded country to rise en masse in their own defence. The result of the conference was for the betterment of the conditions of war, however, as many of the rules laid down have been since incorporated in other codes.

Every nation necessarily has its own minor rules for war, and in the case of most nations they are in conformity with the regulations laid down by the various international agreements of recent times.

The rules for war in use by the United States Government

are codified in a manual called "Instruction for the Government of the United States Forces in the Field." This work is compiled by Dr. Francis Lieber. It was the first war code in the strict sense ever adopted by a nation.

One of its provisions is regarding the kind of weapons to be used. Greater latitude is given for sea warfare than for that on land, as the use of all kinds of torpedoes is countenanced in the various international agreements, while certain kinds of weapons are barred. Those condemned are such as would inflict ghastly wounds and cause unnecessary suffering. The use of poison on weapons or otherwise is also forbidden by the usages of modern warfare.

The employment of savage or half-civilized troops is not allowed by international agreement. Perfidy and solicitation to commit crime are not allowed. Military necessity, the United States war rules declare, admits "of such deception as does not involve the breaking of good faith."

Again, the rules say: "Military necessity does not admit of cruelty—that is, the infliction of suffering for the sake of suffering or for revenge, nor of maiming or wounding except in fight, nor of torture to extort confessions."

It further does not admit of the wanton devastation of an invaded district. The inhabitants of invaded districts are not to be molested in person or property so long as they refrain from hostile acts.

PRISONERS OF WAR.

Prisoners of war must be humanely treated. Officers may be paroled. Deserters found with the enemy may be dealt with as having committed a high crime. Irregular troops, or guerrillas, who put on and take off the character of soldier, may be treated when taken prisoner with added severity.

Private property can be seized only in case of military necessity, for the support and benefit of the army or navy. For property so taken a receipt must be given the owner, who may make it a basis for indemnity. As already shown, hospitals are exempt from the seizure of a hostile army.

Works of art and public buildings are not to be wantonly destroyed, nor are any works of art to be taken away by the invading army. Booty taken on the field is considered the property of the conquering army, but the personal property of prisoners is not subject to seizure. Large sums found on the persons of prisoners may be confiscated, after enough has been left for the needs of the prisoner. This is a great advance from the days when Napoleon looted the treasuries and art galleries of Europe.

There are not many rules laid down to govern war on sea as in the case with war on land. Certain well-defined principles exist, however, concerning the bombardment of an enemy's coast, that are interesting to note at the present time.

In the case of unfortified towns, it is generally expected that a hostile fleet shall leave them in security, owing to their weakness and the fact that their inhabitants are non-combatants, and proceed to cities that are protected by fortifications or otherwise, which are manned by fighting men.

When a bombardment is to take place the citizens of the place to be fired upon should be warned by the admiral of the hostile fleet that so many hours will be given non-combatants to get out. There is no definite rule regarding this, but it is made necessary in order to carry out the spirit of the various codes based on the said Brussels and other declarations regarding the rights of property and persons.

In the case of the bombardment of Alexandria, the most recent of modern times, the inhabitants were warned July 10, 1882, that the British fleet would begin to fire on the rebellious forts the next day. That gave time for all persons so desiring to leave the city. The bombardment lasted two days. The forts were silenced and much of the city reduced to ruins, though its destruction was not due entirely to the bombardment.

RULES AS TO NAVAL WARFARE.

In the case of naval engagements there are no rules laid down as to how they shall be begun, or where they shall be

GEN. FITZHUGH LEE.

fought, except that they cannot take place in neutral waters. If ships engaged in battle are off a neutral coast, and in the course of the engagement they steam or drift inside the three-mile limit, they must cease firing; or if one of them is chased into neutral waters within the three-mile limit, the other cannot molest her there.

The ships of belligerents are not supposed to go into the harbors of neutral ports except in case of necessity, occasioned by stress of weather, sickness on the part of her crew or need of coal. It may be said that this rule has in the past been one of the most often broken. Two nations that have allowed their ports to be used freely by belligerents, as well as their waters to be the theater of war, are Brazil and Portugal.

In the war of the rebellion, England allowed privateers to be fitted out on her territory and to sail from her ports to prey upon the commerce of the Union. There were no less than thirteen of them, of which the Alabama was the most destructive to our shipping. After the award of the Alabama claims against England, the laws of the United Kingdom were made more stringent in regard to the fitting out of privateering vessels in British ports.

The treaty concluded between the United States and England in May, 1871, contained articles of agreement between the two countries that are now practically incorporated in the laws that govern all nations. They are:

"1. A neutral government is bound first to use due diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war against a power with which it is at peace; and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war, as above, such vessel having been especially adapted, in whole or in part, within such jurisdiction to war-like use.

"2. Not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of the renewal or augmentation of military supplies or arms, or the recruitment of men.

"3. To exercise due diligence in its own ports and waters, and as to all persons within its jurisdiction, to prevent any violations of the foregoing obligations or duties."

Coal is the only commodity of war that can be bought in the port of a neutral government by a ship of war, and then only such an amount can be bought as will take the ship to the nearest coaling port in her own country.

PURCHASE OF SHIPS OF WAR.

Any nation has the right to buy ships of war where it pleases in time of peace. In case of war this right ceases, so far as buying ships of neutrals is concerned.

Neither can a nation which is neutral loan money to a belligerent nation for the purpose of carrying on a war with another nation. In the case of a subject of a neutral nation making a war loan to a belligerent, he does it at his own risk and against the law. It has been ruled in the courts of both the United States and Great Britain that no legal recovery can be made for such debts, in case the debtor refuses to pay.

It goes without saying, however, that so long as a nation has collateral to put up it can borrow money in time of war. There are plenty of ways in which international law can be circumvented, both in the case of borrowing money and of buying ships.

In relation to the latter, the sale of two ships by Chili to Japan in the late Oriental war is a good instance of how easily the thing can be done.

Chili had two war vessels that Japan wanted. Chili was at peace with China, then at war with Japan, and she could not sell the ships directly to Japan. The ships were the Esmeralda and the Arturo Prat. The first thing known by the public of the sale was that the ships had been bought by the New York house of Charles B. Flint & Co., who may be called the financial guardian of half of the governments of South America.

This firm sold the ships to Bolivia. It happens that Bolivia has no navy, not being a maritime nation, and she was,

therefore, not amenable to the laws between maritime nations. She could, therefore, sell the ships to Japan, which she did, as the agent of the New York house that acted as the brokers in the transactions between Chili and Japan. The ships were renamed by the Japanese, being christened the Idzumi and Tsukushi, respectively. The transaction was never called into question by China, and probably would not have been had that nation been the victor instead of the vanquished.

PRIVATEERING IS LAWFUL.

The declaration of Paris was intended to revolutionize the methods of sea warfare. It accomplished that purpose so far as the signing powers were concerned, but it had no effect on the United States.

This government took the ground that it could not afford to give up the right to send out privateers to prey on an enemy's commerce, owing to its small navy. Privateers would be a powerful arm of the naval service in time of war. It is true that after the Civil War broke out the government made overtures to have the four rules of the declaration apply to this country, but it was with the provision that the signers of the declaration agree to the exemption of all innocent goods of enemies from capture. The signers thought that if this privilege was granted it would shield the North from the privateers of the South, and as France and England had recognized the belligerency of the South, they declined to accede to the request of the United States.

The declaration of Paris applying only to those who signed it, the ships of the United States are subject to capture by the privateers of any and all nations, as well as those of Spain. France could not send out privateers against England, for example, in time of war, but were she at war with us, she could send them out against us, in spite of her agreement with England and other powers.

Spain being bound to none of the powers, she could send out privateers against any or all in time of war. She would

find it difficult to inflict any national damage on the coastwise commerce of the United States, owing to the distance from her base of supplies. The alarm often expressed on this score has little foundation.

Privateers are allowed to take their prizes into their own ports, and turn them over to the proper authorities, the courts being called on to award the prize money. They are supposed to carry on a humane warfare. They are not wantonly to destroy vessels or goods when port can be reached, but it is a common usage that when a prize cannot be brought to port she is to be burned.

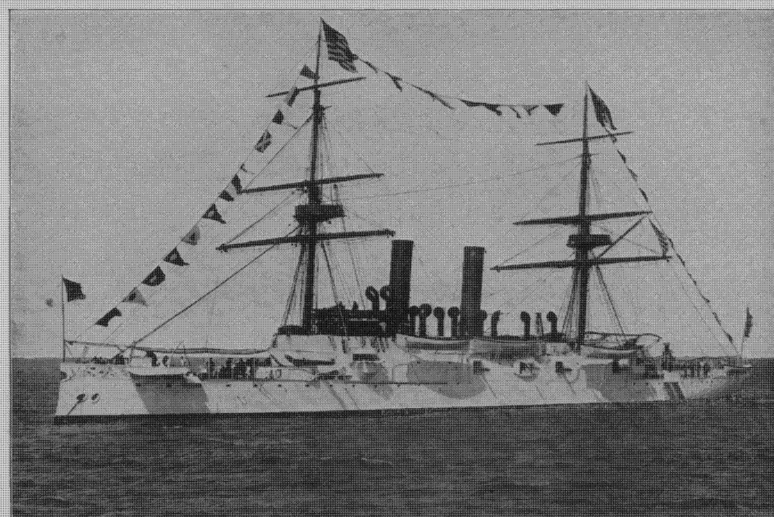
Prisoners are to be humanely treated when taken by the privateers.

WAR AS TO RETALIATION.

On the subject of retaliation, instructions are set forth as follows: Peace is the normal condition of nations; war is the exception. The ultimate object of all modern war is a renewed state of peace. The more vigorously wars are pursued the better it is for humanity. Sharp wars are brief.

Ever since the formation and coexistence of modern nations, and ever since wars have become great national wars, war has come to be acknowledged, not to be its own end, but the means to obtain great ends of state or to consist in defence against wrong, and no conventional restriction of the modes adopted to injure the enemy is any longer admitted; but the law of war imposes many limitations and restrictions on principles of justice, faith and honor.

The law of war can no more wholly dispense with retaliation than can the law of nations, of which it is a branch. Yet civilized nations acknowledge retaliation as the sternest feature of war. A reckless enemy often leaves to his opponent no other means of securing himself against the repetition of barbarous outrage. Retaliation will, therefore, never be resorted to as a measure of mere revenge, but only as a means of protective retribution, and, moreover, cautiously and unavoidably. That is to say, retaliation shall only be resorted to after care-



Speed, 15½ Knots. BOSTON (Protected Cruiser). Cost, $619,000.

ful inquiry into the real occurrence and the character of the misdeeds that may command retribution.

Unjust or inconsiderate retaliation removes the belligerants further and further from the mitigating rules of a regular war and by rapid steps leads them nearer to the internecine wars of savages.

PROTECTION TO PROPERTY AND PERSON.

In this connection, under the rules of law, a victorious army appropriates all public money, seizes all public movable property until further direction by its government, and sequesters for its own benefit or that of its government all the revenues of real property belonging to the hostile nation or government. As a general rule, however, the property belonging to churches or hospitals, educational or charitable institutions shall not be considered public property.

The United States acknowledge and protect in hostile countries occupied by them religion and morality, strictly private property, the persons of the inhabitants, especially those of women, and the sacredness of domestic relations. Offences to the contrary shall be rigorously punished. Private property, unless forfeited by crimes or by the offences of the owner, can be seized only by way of military necessity for the support or other benefit of the army of the United States.

All wanton violence committed against persons in the invaded country, all destruction of property, unless authorized by the commanding officer; all robbery, all pillage or sacking, even after taking a place by main force; all rape, wounding, maiming or killing of such inhabitants, are prohibited under the penalty of death or such other severe punishment as may seem adequate for the gravity of the offence.

A soldier, officer or private, in the act of committing such violence and disobeying a superior ordering him to abstain from it may be lawfully killed on the spot by such superior.

DESERTERS AND PRISONERS OF WAR.

Deserters from the United States army, having entered the

service of the enemy, suffer death if they fall again into the hands of the United States. A prisoner of war is a public enemy armed or attached to the hostile army for active aid, who has fallen into the hands of the captor, either fighting or wounded, on the field or in the hospital, by individual surrender or capitulation. Citizens who accompany an army, such as sutlers, reporters or contractors, if captured, may be made prisoners of war and be detained as such.

The enemy's chaplains, surgeons, apothecaries, hospital nurses and servants, if they fall into the hands of the American army, are not prisoners of war unless the commander has reason to retain them. A prisoner of war is subject to no punishment for being a public enemy, nor is any revenge wreaked upon him by the intentional infliction of any suffering or disgrace by cruel imprisonment, want of food, mutilation, death or any other barbarity.

Prisoners of war are subject to confinement or imprisonment such as may be deemed necessary on account of safety. They may be required to work for the benefit of the captor's government, according to their rank and condition. Those who attempt to escape may be killed in flight. In case of a conspiracy for the purpose of a general escape the conspirators may be rigorously punished, even with death.

Outposts, sentinels or pickets are not to be fired upon, except to drive them in or when a positive order, specified or general, has been issued to that effect. The use of poison in any manner is wholly excluded from modern warfare, and he who uses it places himself out of the pale of the law and usages of war.

Whoever intentionally inflicts additional wounds on an enemy already disabled, or kills such an enemy, or who orders and encourages soldiers to do so, shall suffer death, if duly convicted, whether he belongs to the army of the United States or is an enemy captured after having committed his misdeed.

SPIES AND FLAGS OF TRUCE.

Scouts or single soldiers, if disguised in the dress of the

country or in the uniform of the army hostile to their own, employed in obtaining information, if found within or lurking about the lines of the captor, are treated as spies and suffer death. Armed prowlers, by whatever names they may be called, or persons of the enemy's territory who steal within the lines of the hostile army for the purpose of robbing, killing or of destroying bridges, roads, canals or telegraph wires are not entitled to the privileges of the prisoner of war.

A spy is defined as a person who secretly, in disguise or under false pretences, seeks information with the intention of communicating it to the enemy. The spy is punishable with death by hanging by the neck, whether or not he succeeds in obtaining the information or in conveying it to the enemy. If a citizen of the United States obtains information in a legitimate manner, and betrays it to the enemy, be he a military or civil officer or a private citizen, he shall suffer death. The law of war, like the criminal law regarding other offences, makes no difference on account of the difference of sexes concerning the spy or the traitor.

The bearer of a flag of truce cannot insist upon being admitted. He must always be admitted with great caution. Unnecessary frequency is to be carefully avoided. If the bearer of a flag of truce offer himself during an engagement, he can be admitted as a very rare exception. It is no breach of good faith to retain such a flag of truce, if admitted during an engagement. Firing is not required to cease on the appearance of a flag of truce in battle.

If the bearer of a flag of truce, presenting himself during an engagement, is killed or wounded, it furnishes no ground of complaint whatever. If it be discovered, and fairly proved, that a flag of truce has been abused for surreptitiously obtaining military knowledge the bearer of the flag is deemed a spy.

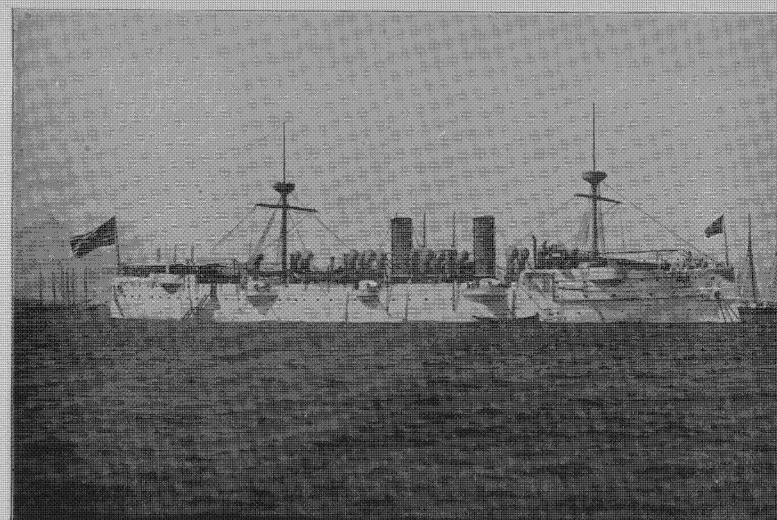
It is customary to designate by certain flags, usually yellow, the hospitals in places which are shelled, so that the besieging army may avoid firing on them. It is justly considered an act of bad faith to deceive the enemy by flags of protection. Such acts of bad faith may be good cause for refusing to respect such flags.

In the matter of naval warfare the laws of war are not so clearly defined. This is natural, inasmuch as the possible loss to personal property is not so great, and at sea only those directly implicated in the engagements are to be considered. There are no non-combatants in naval warfare.

The main issue is that of privateering. By the declaration of Paris the signatory powers declared privateering abolished. This declaration has been acceded to by all maritime powers except the United States, Spain and Mexico. So in case of a brush with the Spaniards privateering will probably be recognized by both governments.

The United States have taken a somewhat varying position toward privateering. After the Revolutionary War treaties were made providing for its abolition. During the War of 1812 privateering was extensively practiced, but during the Mexican War it was not indulged in by either side. In 1856, when it was proposed to the United States to accede to the Declaration of Paris, the government declined unless private property at sea was exempted from capture.

In 1863, during the Civil War, a law was passed by Congress providing for the issuing of letters of marque and reprisal by the President, but the law was never put into execution. The United States still maintains the right to issue letters of marque and reprisal to the fullest extent, and it is only a question of policy which would prevent its exercise in any war which might come along.



Speed, 20 Knots. BALTIMORE (Protected Cruiser). Cost, $1,325,000.

CHAPTER IV.

TORPEDOES' USE IN WAR.

DELICATE INSTRUMENTS THAT CARRY CERTAIN DESTRUCTION TO THE MOST POWERFUL SHIPS—WONDERFUL INGENUITY IN PERFECTING DETAILS—THE CRUDE INSTRUMENTS FIRST MADE—THEIR GRADUAL IMPROVEMENT, UNTIL NOW THEY ARE THE MOST DREADED IMPLEMENTS OF WAR ON THE WATER—DEVICES FOR REGULATING SPEED, RADIUS OF ACTION, IMMERSION AND ALMOST ABSOLUTE CERTAINTY OF KEEPING A STRAIGHT COURSE.

Torpedo warfare began during the American civil war, but so crude were the early torpedoes and so little opportunity has there since been to study the action of modern torpedoes in actual war that naval officers all over Europe have looked forward eagerly to a war between the United States and Spain as an object-lesson. That the torpedo years ago passed the experimental stage and stands today as the most wonderful and terrible of modern engines of war is not to be doubted, but it has had no real test of its power. Not one torpedo has been fired in warfare by any of the leading naval powers in more than twenty years, and so great has been the advance in torpedo construction within this time that the early tests are of little value to the present student of naval affairs.

Since the torpedo became a machine of precision it has been used in warfare only by insurrectionists and weak nations. The war between China and Japan three years ago gave some idea of the value of the torpedo, but neither its full value nor its place could be determined in that short and unequal contest between two half-civilized nations.

Thirty-seven torpedo attacks have been made thus far, sinking a dozen ships and damaging one other. Six assailant boats have been lost.

The Whitehead torpedo record only is interesting, for it is the only automobile torpedo which has ever been used in war and is practically the only torpedo in use today. The United States was the last leading nation to adopt the Whitehead, the Navy Department delaying action with the hope that an American engineer would produce the Whitehead's equal, until a half-dozen years ago the navy's imperative need of torpedoes forced the adoption of the Whitehead.

TORPEDO ATTACKS THUS FAR.

Here is a summary of attacks with Whitehead torpedoes:

Yio, Peru, May 29, 1877.—English launch Shah fired one torpedo at Peruvian ship Huascar, in motion at sea, day; missed.

Batum, Russia, December 27, 1877.—Two Russian launches fired two torpedoes at Turkish ship Mahmudieh, at anchor, night; both probably struck booms.

Batum, Russia, January 25, 1878.—Two Russion launches fired two torpedoes, 100 yards range, at Turkish ship, at anchor, foggy night; ship sunk.

Valparaiso, Chili, January 27, 1891.—Launch of Congressionalists' ship Blanco Encalada, fired one torpedo at Balmacedists' ship Imperial, at anchor; missed.

Caldera Bay, Chili, April 23, 1891.—Balmacedists' torpedo gunboats Lynch and Cordell fired five torpedoes, 100 to twenty yards range, at Congressionalist ship Blanco Encalada, at anchor, cloudy morning, before dawn; ship sunk; Lynch hit four times, but not damaged.

Santa Catherina, Brazil, April 15, 1893.—Peixotoists' torpedo gunboat Sampaio and three torpedo-boats fired four torpedoes, 160 yards range, at Melloists' ship Aquidaban, at anchor, night; Aquidaban sunk, Sampaio hit twenty-five times without being damaged.

Off the Yalu, September 17, 1894.—Chinese torpedo-boat fired two torpedoes at Japanese ship Hiyel, in motion, during battle, day; no result. Chinese torpedo-boat fired three torpedoes, fifty yards range, at Japanese ship Saikio; no result.

Wei-Hai-Wei, February 2, 1895.—Japanese torpedo-boats attacked Chinese fleet, at anchor, night; assailants fired upon, attack abandoned. February 5, 1895.—Ten Japanese torpedo-boats fired ten torpedoes, 330 yards range, at Chinese ships Ting Yuen and Lai Yuen, at anchor, dark night; Ting Yuen sunk; one torpedo-boat sunk and twelve men lost, another boat ran ashore, only one uninjured. February 6, 1895.—Six Japanese torpedo-boats attacked Chinese ships Lai Yuen, Wei Yuen and Ching Yuen, at anchor, dark night; Lai Yuen capsized.

The new American Whiteheads, officially known as "W. T., 5 metre, 45 centimetre, mark I. U. S. N., now building for the government in Brooklyn, are distinctively American torpedoes, although made under licenses from the original Whitehead Company at Flume, Hungary, the birthplace of the Whitehead. At the time of the outbreak of the American civil war Captain Lupuis, an Austrian naval officer, submitted to his government the first automobile torpedo. It was run by clockwork and guided from shore by ropes. The government liked the idea, but recommended the selection of a better motive power and a simpler means of guiding. Three years later Lupuis met Whitehead, then manager of an engine-manufacturing company at Flume, and exhibited his torpedo plans. Whitehead secretly made the first Whitehead torpedo, and two years later submitted it to the Austrian government. Externally it had the appearance of a modern torpedo; its weight was 300 pounds, and it carried a charge of eighteen pounds of dynamite. A compressed-air chamber, charged to a pressure of 700 pounds to the square inch, supplied the motive power. For short distances the torpedo attained a speed of six knots.

THE GENERAL ARRANGEMENT.

The new American Whitehead not only has the power to blow up any ship afloat, but its intricate and delicate mechanism makes certain its path under the water. The variations from its course are so slight that it can be fired from the

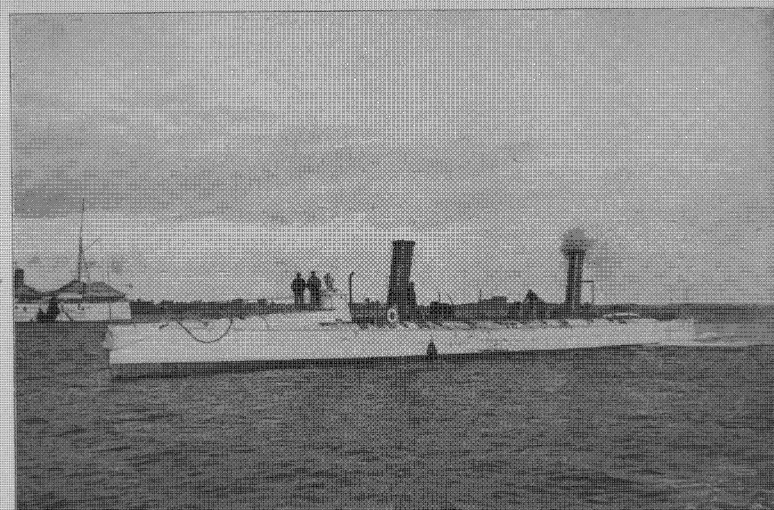
launching tube with the same confidence in its ability to reach the target as when the seacoast artilleryman fires a steel shell from a heavy gun. The torpedo is built of steel in the shape of a porpoise, with a big double-bladed tail. Ready for firing it weighs 1160 pounds, but its weight in water is but a half pound. Its length is five metres (about sixteen feet five inches), its greatest diameter forty-five centimetres (17.7 inches). It is assembled in four sections—the head, air flask and immersion chamber, after body, and tail—all fitted together with sleeve joints and held together by joint screws. The walls are made of the finest forged steel, to resist the enormous air pressure. Bronze bulkheads separate the sections. Near the after end of the air flask is a bulkhead of the small immersion chamber. The after body is also divided into two compartments, so that in all there are five compartments within the torpedo's steel shell.

Compressed air is the motive power. This is contained within the air flask, a hollow forged steel cylinder nearly half as long as the torpedo, slightly tapering at the ends, with dome-shaped heads screwed and soldered in each end. On shipboard this flask is filled by an air-compressing engine, and the pressure attained is 1350 pounds to the square inch. The flask is tested for a pressure of 2000 pounds.

The engine consists of three cylinders radiating out from the propeller shaft, like a three-leaf clover. The cylinders could be carried in one's overcoat pocket, but they have a combined power of thirty horse-power.

HOW THE GUN COTTON IS EXPLODED.

Wet gun cotton, weighing 220 pounds, is carried in the torpedo's blunt phosphor-bronze war head, double the amount carried in the smaller torpedo first issued to the navy. The gun cotton is in disks. Into the nose of the torpedo is inserted a metal cylinder, reaching back some distance through openings in the gun-cotton disks. This cylinder, the primer, holds a series of small dry gun-cotton cylinders. The forward cylinder is pierced to receive the detonating primer of



Speed, 24 Knots. ERICSSON (Torpedo Boat). Cost, $113,500.

fulminate of mercury, capped with a percussion cap. The war nose screws into the forward end of the primer case. When the torpedo is launched a blow on the war nose will not explode the gun cotton, but as the torpedo runs through the water a little fan on the nose is revolved like a paper-spinning wheel. A nut is screwed through a traveling sleeve by the turning of the fan until it rests on the firing pin.

When the torpedo strikes the firing pin is driven in, detonating the cap, the fulminate of mercury, the dry gun cotton and then exploding the 220 pounds of wet gun cotton. This system of explosions is made necessary by the nature of gun cotton. This high explosive, one of the most powerful destroyers ever evolved from the chemists' laboratory, is exploded with difficulty. Were the war head simply loaded with wet gun cotton, the impact of the head against the ship's armor would not explode the gun cotton. Even dry gun cotton might not explode. Gun cotton on shipboard is always kept wet. It is more difficult to explode, but more violent in its action. Dry gun cotton is about the only thing that is sure to explode wet gun cotton, and dry gun cotton is exploded by a mercury fulminate detonator. The latter is easily exploded by a cap and instantaneously expands to 2500 times its original volume. The sudden pressure explodes the dry gun cotton. The war head is never used in times of peace. Instead a blunter practice head of steel is used. It is ballasted by filling it with fresh water.

No government would now spend a cent for a torpedo which could not be depended on to reach the point aimed at. The maximum effectiveness of a torpedo in an attack on a battleship is reached when the torpedo strikes the vessel amidships, well below the heavy side armor belt. The explosion drives in the armor at its weakest point, explodes the boilers and nearby magazines and insures the sinking of the ship. Struck near the water line, a heavy battleship (while the havoc wrought would be terrific) might be able to keep above water for hours and do effective service in an engagement. The Ting Yuen, one of the battleships of the Chinese fleet at Wei-Hai-Wei, at early dawn on February 5, 1895, was at-

tacked by the Japanese torpedo flotilla. One of the six Whitehead torpedoes fired at the Ting Yuen and Lai Yuen struck the former in the stern near the water line. The torpedo tore a big hole in the armor, and, although the watertight doors and compartments failed at the critical moment, the ship sank very slowly, and her gunners sank the assailant, killing all of her crew.

KEPT AT A FIXED DEPTH.

Remarkable alike for the completeness of its control of the movement of the torpedo and the simplicity of its action in the mechanism which keeps the torpedo at any fixed depth. In each of the horizontal fins of the torpedo's tail is a rectangular rudder, about two inches wide and three inches long, in its normal position flush with the fin. Obviously, if these little rudders swing up, the torpedo will be deflected upward and vice versa, their action being the same as that of the horizontal fins on a fish.

So simple is the horizontal rudder mechanism, it is strange that its construction was so long a secret. It can be best understood by reference to the accompanying diagram, in which the underlying principle of the action of the mechanism is shown in a conventional way, no attention being paid to dimensions or detail parts. Abaft the immersion chamber is a small compartment of the after body of the torpedo, around the exterior wall of which are a number of large holes, freely admitting water to the chamber when the torpedo is launched. The pressure of water varying with the depth, as the torpedo sinks, the diaphragm (D) is pressed inward, forcing the piston (A) forward and swinging the armed section (Y) about on its fixed pivot to the position indicated by the dotted lines. The long arm (M) carries forward the rod (K), swinging the pendulum (P) forward and pulling about on its fixed pivot the sector (Z), which carries the horizontal rudder (R). The raised rudder points the torpedo upward, and as it ascends the pressure of the water on the diaphragm growing less, the piston gradually resumes its normal position, pulling down

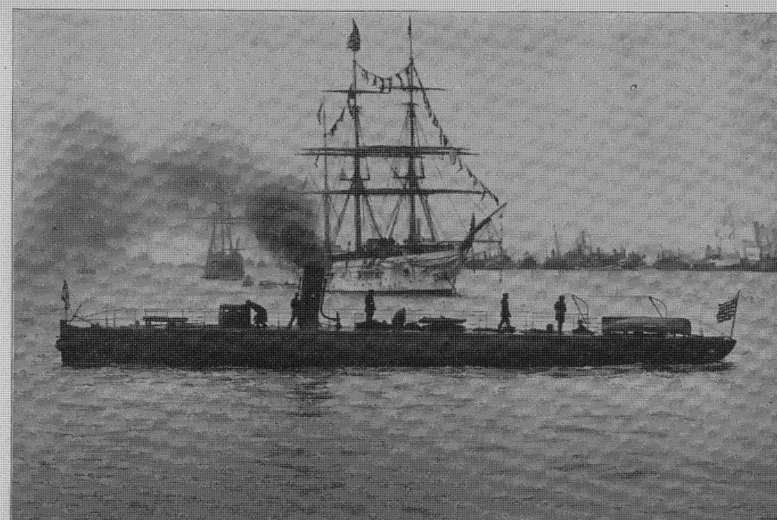
the rudder to a horizontal position. The torpedo takes a more and more direct course until it is running straight ahead.

In a torpedo attack upon an armored vessel the officer who directs the attack determines at what distance below the water line of the vessel a torpedo will do the most damage. Battleships of heavy draught are attacked at a point fifteen or twenty feet below the surface, while light-draught cruisers and monitors are attacked higher up. One of the parts of the immersion chamber of the new Whitehead is the depth index, by means of which the depth at which the torpedo runs is fixed by the turn of a wrench. So finely is the torpedo made, its weight in water varying but a few grains from a half-pound, that its immersion is a simple matter.

When the officer in charge of the torpedo learns the depth at which it is to run he has one of the men of the squad turn the spindle until the vertical wheel shows the distance. This so fixes the piston spring that the piston is pushed outward and the horizontal rudders consequently held down until the torpedo reaches the determined depth, then the pressure of the spring on one end of the piston is equal to the pressure of the water on the other end.

Torpedoes are now fired from American ships without the long series of commands recently in use. The men of the torpedo crews are schooled in their individual duties, so that few commands are needed. Before the torpedo is entered into the breech for a practice run, the distance gear must be set to fix the point at which the torpedoes' engines will stop, the speed regulator must be set, the locking dial must be set to fix the distance from the ship when the engines will start, the rudder index must be set to fix the depth of the initial dive and the depth index must be set to fix the depth at which the torpedo will run. In an attack only the last of these operations might be necessary. In practice the air flask is generally connected with the air compressor just before launching, for the most finely made torpedoes cannot be made airtight against the pressure of 1350 pounds to the square inch. When all the adjustments are made the breech door is closed and a cartridge carrying a few ounces of powder placed in the firing

pistol on top of the breech. The pistol is fired by electricity either from the torpedo-room or the conning tower. The slight shock is enough to drive the torpedo out into the water, the starting lever being tripped back by the tube projection. When the torpedo strikes the water the water tripper is thrown back and the engines are started at full speed. By the aid of the torpedo indicator an arrangement of three triangulated arms on a semi-circular arc, the torpedo is aimed with due allowance for the speed of the ship, the speed of the enemy, the speed of the torpedo and the training of the torpedo tube.



Speed, 18½ Knots. STILLETTO (Torpedo Boat). Cost, $25,000.

CHAPTER V.

THE MAN IN THE MILITARY MAST.

WHERE GRIM DEATH LURKS IN BATTLE—THE MILITARY MAST, THE MOST EXPOSED POINT ON A BATTLESHIP, WHERE THE CHANCES ARE ALL FOR DEATH.

The heroes of the coming war will be the men detailed to duty in the military masts, or fighting tops, of our big battleships. The topman's position will be one of unspeakable peril. When he goes up into one of those dread places he must realize that his chances of coming down alive are very slight. Exposed to the full fury of the enemy's fire, with scarcely any protection, and with the possibility of having the entire mast shot away, his is a position perhaps the most dangerous in all modern naval warfare.

The steel barbettes of the present time, save in certain battleships, where an overhead shield is carried, give a protection more apparent than real, more picturesque than practical. And while the military top crews have the advantage of seeing something of the scrimmage, yet they present too inviting a mark to the enemy, and have stations which in battle are pretty sure to be untenable from the heat and smoke.

The small arms men have frequent practice aboard ship, and, considering the difficulties of the environment, are good marksmen. It is no easy task to fire from a platform placed at the fob end of a pendulum, swinging irregularly, and the results attained testify to the value of the drill and to the physique of the individual.

WHERE GRIM DEATH LURKS.

On the larger battleships the military masts are hollow, and access to the fighting tops is gained through the interior.

The ammunition is also passed up inside. In the smoke and grime of battle one can well realize what a hell these places would be.

Another thing that must be considered is the fact that this will be the United States Navy's first practical test of the modern warship. The last ten years have brought about a greater and more sudden change in the outward appearance of men-of-war than has ever been recorded in the history of naval affairs. This is in the main due to the almost complete banishment of sails, yards and the more or less intricate rigging necessitated by their use, in favor of military masts, or, in some cases, mere signal poles.

The rig of the ironclad battleship of ten years ago differed in no very essential particular from that of the ships of long ago; but now, in a single decade, all is changed. Before the change some progress had been made in utilizing the ordinary tops in action by placing riflemen or machine guns in them, in order to direct a plunging fire on the enemy's deck. It will be remembered that it was a shot fired from the mizzentop of the Redoubtable that laid Nelson low in the moment of victory.

THE ANCIENTS USED THEM.

As a matter of fact, military tops, although greatly improved as now constructed on our battleships, are by no means new in naval warfare. They are represented in the drawings and carvings of Egyptian and Asiatic warships nearly two thousand years before Christ. In mediaeval days the fighting top was a recognized part of a ship of war. Archers and slingers poured their missiles down from them on the decks of their enemies, or stones, quicklime and Greek fire were hurled upon the heads of the opposing crews. In the earlier days the top was at the extreme summit of the mast, but as ships got bigger and masts loftier it was placed lower down.

The next step was also rendered necessary by the growth of masts and spars, for when heavily-rigged ships, such as the Great Harry, and the ships which took part in the Armada

fight, came to be built, it was necessary to enlarge the circumference of the top to give a support to the shrouds which upheld the topmast. From this period the top as a fighting platform disappeared till recently, except in the war galleys of the Mediterranean and Baltic, which had a curious basket top at their mastheads, known as a "gable."

The military mast of today is constructed primarily to carry guns, and secondarily for signalling purposes, for it must be remembered that in all cases in which ships have been equipped with fighting tops since their very first inception, the primary duty of the mast which upheld it was to carry sail for the propulsion of the ship.

Some of the masts are supplied with an upper top for the electric light, a peculiarly-shaped edifice below to enable three quick-firing guns to be discharged right ahead, and a species of conning tower below, from which the captain can overlook the smoke clouds and so see to direct his ship in action. The later types are all constructed with much the same ideas.

Some have a lookout, or conning tower, others have not, but all have three or six-pounder quick-firing guns and electric-light projectors, and one or two lighter machine guns in addition.

The small calibre rapid-fire and machine guns employed in tops are supported by riflemen, and in every fight their work of clearing the guns, sweeping the decks and superstructures, and of picking off the officers and leading men is, to say the least, hazardous. In the galley days the military tops were fairly well protected, but during the sail era the topmen handling the swivel pieces and deck-rakers, and forming a special corps of musketeers, had no protection, except what was given by a network of mattress-filled hammocks.

TARGETS FOR SHOT AND SHELL.

It would take a big projectile to bring a mast down, but then, if it did, great would be the fall thereof. And think of the poor devils that would come crashing down with it! And think of them even if the mast doesn't come down, perched

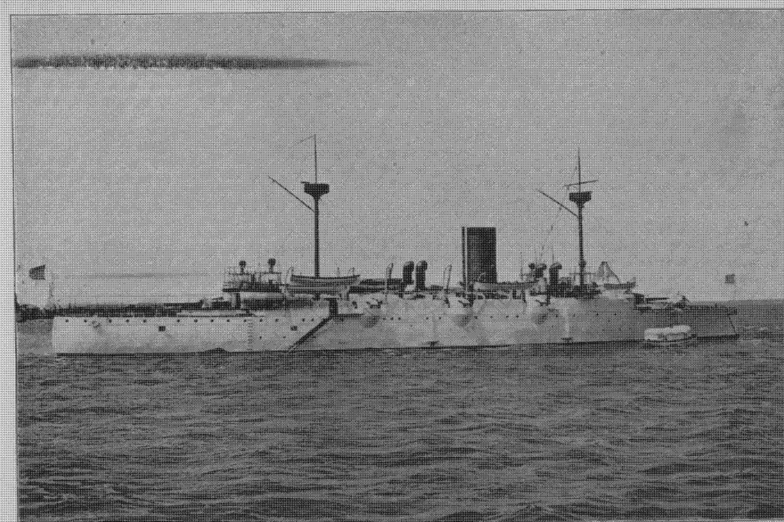
up there, living targets for shot and shell! The thin plating is of no avail against anything larger than a rifle bullet, and a small shell might pass harmlessly over the heads of the men in an open top which in a closed one would have been burst by the iron sides, and scatter death and destruction within.

A curious umbrella-like structure is the production of the brain of that versatile genius, the Emperor of Germany, and was intended to be placed on board the ship which was to be built to replace the old Preussen. Although offering the greatest possible protection, it was found to be impracticable.

The only practical test of the modern battleship was the brush between China and Japan, and it was my good fortune the other day to have a talk with a sailor who had been in that fight.

In the depths of the ship men were stripped to their waists, throwing coal into the huge furnaces; in the turrets the gunners stood to their guns; in the after cabin and in the cockpit the sailors paced back and forth awaiting orders for action, not uttering a word, with every muscle and every nerve at extreme tension. The firemen, water-tenders and coal-heavers were shut up in the fire rooms out of danger from shot or shell, but certain of a terrible death should the vessel be sunk or a magazine explode. On the platforms, at the reversing gear, at every valve and throttle were stationed men to make response to every command. Oilers moved about filling the cups; cadets were at the voice tubes and annunciators; in the magazines and shell rooms far below the water line, on the lower flats and at successive stations men stood to guide the shells and cylinders of powder.

The crews of the eight and twelve-inch guns in the turrets had cutlasses and revolvers strapped about them, while at the lighter guns stood sailors in small groups. All men not needed were directed to remain in the shelter of the barbettes and turrets. Officers of divisions walked to and fro or leaned upon their swords with frequent glances ahead. The Captain was on the bridge, the navigator in the tower, the quartermaster at the wheel and petty officers at the engine signals. On one of the flats below the protective deck was the sur-



Speed, 18 Knots. CHARLESTON (Protected Cruiser). Cost, $1,017,500.

geons' table, with a long row of glistening steel instruments, rows of bandages and buckets of water.

It soon became known, even among the sailors, that orders had been given to fire from the lighter guns when the enemy was 4000 yards away, and to fire the main battery at a distance of 2500 yards. This was to give time during the advance for from fifteen to forty shots from each light gun and two from the large guns in time to train abeam for the passing broadside.

THE FIGHTING BEGINS.

The Japanese boat could now be plainy seen, and the orders came to fire. The boom of the guns, the smoke of the powder, changed everything on board ship. There was now no expectancy, no suspense. The men in the turrets and the men at the lighter guns were blackened with the powder, and the smell of powder was all over the ship.

The sailors forgot all fear. Amid the smoke and the dust they became as enraged animals. No thought of danger entered their minds; no realization of peril was upon them. They talked, they laughed, they yelled as if in glee. The battle had commenced. The Japanese vessel, uninjured by the fire from the lighter guns, bore steadily down upon the Chinese ship. Four other Japanese vessels were reported, and it was evident that the Chinese ship, while very much larger than any of her antagonists, was engaging in a desperate fight.

When the Japanese man-of-war was 2500 yards distant the eight and twelve-inch guns sent forth their deadly missiles. The Japanese boat returned the fire, and the sailors watched the shells as they mounted the height of their trajectories and fell toward the mark. As calmly they watched the shells, as though they were not freighted with certain death and destruction. It was evident that one, at least, had been fired true and would fall upon the Chinese vessel. It struck the forward turret and crashed through, silencing two guns and forever silencing the voices of twenty gunners.

The lighter guns kept up the fight, which waxed hot and furious as the two ships approached each other. Soon they were at broadsides, and the guns of each vessel swept the decks of the other. One after another the gunners fell, and the reserves were called out to take their places. The decks were so slippery from the blood of the wounded men that it was almost impossible for the sailors who were as yet uninjured to take the positions they were ordered to fill.

CHAPTER VI.

IN A TORPEDO-BOAT.

ITS CREW CARRY THEIR LIVES IN THEIR HANDS—AN OBSTRUCTION MAY WRECK IT, A SINGLE SHOT SEND IT TO THE BOTTOM AND THERE IS CONSTANT DANGER OF THE PREMATURE EXPLOSION OF ITS DEADLY FREIGHT OR ACCIDENT TO ITS MACHINERY—DISCOMFORTS THAT BECOME UNBEARABLE.

The swift-going torpedo-boats, now so much sought after by the Navy of the United States for use against Spain, are without doubt the most uncomfortable and dangerous craft afloat. Every man who goes aboard one of them takes his life in his own hands. There is danger on the outside and danger on the inside, danger above and danger below, to say nothing of discomfort which often amounts to actual suffering. The interior of these boats is almost as hot as hades is credited with being, and at any moment one of the overcharged boilers or steam pipes may burst and scald everybody inside the boat to death.

ONE SHOT WOULD SINK IT.

A single shot from an enemy's gun would sink any one of them, and it need not be a very large gun, either. The intense heat inside the boat renders the torpedoes and high explosives likely to explode prematurely, and the shock of a collision is also likely to set them off and blow the boat and everyone aboard her into minute fragments. Cold provisions have to be used, for the reason that there is neither time nor appliances for cooking, and not even the comfort of standing erect can be enjoyed. The breaking of the propeller or crankshaft is likely to wreck the engines, kill everyone in

the engine-room and render the helpless boat an easy mark for an enemy's shot.

DELICATELY CONSTRUCTED.

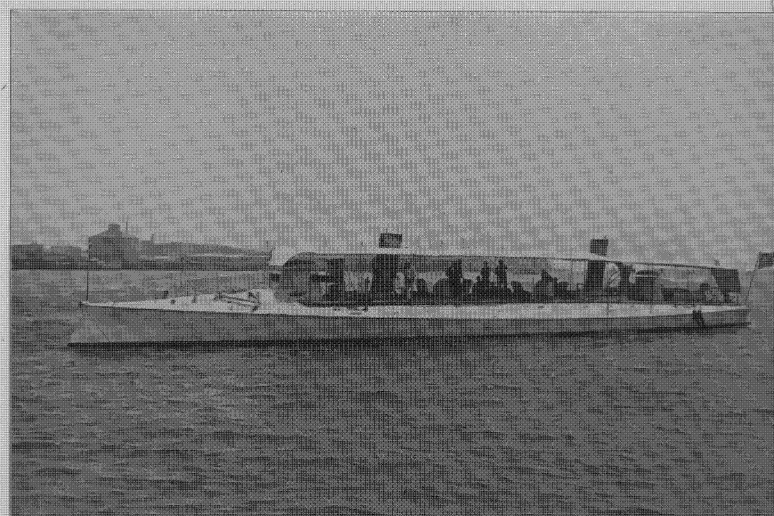
For the benefit of those whose acquaintance with torpedo-boats is decidedly limited—and there are thousands of them—it may be said a torpedo-boat is a long, narrow, low steamer, in the designing of which everything is sacrificed to speed. Personal comfort and the safety of the crew are lost sight of. The interior is divided up into compartments by water-tight bulkheads. First comes the collision bulkhead, which is about eight feet abaft the stem. In this forward compartment there is nothing, as it is likely at any time to fill with water should the boat strike an obstruction. So thin and delicate are these boats that even if one collided with a broken spar its bows would be stove in.

THE TORPEDO-ROOM.

Back of this collision bulkhead is the torpedo-room, in which the dangerous explosives are stored. Next comes the crew's quarters—a little pen of a place where the men are packed like sardines in a box. Then comes the boilers and engines, and abaft of them the officers' quarters, which are often so confined that they have to be constantly ducking their heads as they move about. The engineers occupy the quarters with the officers. When the boat is going at full speed she is trembling, twisting, rolling, pitching and shaking up everybody aboard her to such an extent that it is often difficult for the officers and men to talk.

BAD SEA BOATS.

The jarring of a railroad train is nothing compared with this vibration. It will shake the last drop out of a tumbler of water on the little cabin table, even in smooth water. Matters go from bad to worse when the boat is at sea in rough



Speed, 22½ Knots. CUSHING (Torpedo Boat). Cost, $82,750.

water. Torpedo-boats are notoriously bad sea boats, and it is at sea that the full discomfort is realized. The hatches must be battened down to keep out the tons of water which are constantly rolling over the vessel's decks, and the heat, together with the smell of heated oil, the suffocating effect of steam and the closeness of the confinement, become almost unbearable. Often for days the luckless crew do not get an hour's sleep at any one time, and have to subsist on whatever kind of cold stores they can readily grab and eat as they hold on to prevent themselves being hurled about by the violent pitching and rolling of the vessel.

NO MEANS OF DEFENCE.

The average torpedo-boat can carry about twenty-five tons of coal, four torpedoes and twenty men. They are intended to sneak up close to an enemy's warship, discharge a torpedo the moment they get within range and then beat a rapid retreat. They must be fast enough to get out of the range of the enemy's guns before they are discovered, or a single shot will send one to the bottom with all on board. They have no means of defence, and their only protection is their speed. So fatiguing is the work of the men aboard these little wasps of the ocean that the crews have to be changed every few days.

CHAPTER VII.

THE DEADLY AIR-GUN

FIRES A 500-POUND CHARGE OF HIGH EXPLOSIVES—ARMOR NO PROTECTION AGAINST THESE AERIAL TORPEDOES, WHICH CAN BE HURLED RAPIDLY AND WITH ABSOLUTE PRECISION AT FORT OR VESSEL—NOT A SINGLE ACCIDENT IN TEN YEARS' EXPERIMENTS—TO BE USED IN THE DEFENCES OF BALTIMORE.

As the pneumatic tire has revolutionized the bicycle, so from all indications will the pneumatic gun revolutionize modern warfare. Charges of high explosives—dynamite, nitro-glycerine, nitro-gelatine, gun-cotton, etc.—up to 500 pounds, may be hurled through the air in such manner that the nets or armor of a hostile warship afford absolutely no protection against the destructive projectile.

FOR OFFENCE AND DEFENCE.

It is valuable for both offence and defence. It is adapted not only for harbor and coast defence, but for bombardment, naval warfare, countermining, etc. Very small charges have sometimes been fired from powder guns, but more frequently it has resulted in bursting the gun, a result that is bound to follow in all cases where powder is used. The advantage of compressed air lies in the fact that when it expands it cools rather than heats the gun. Extensive experiments have been conducted with these pneumatic guns for the past ten years, and never during all these experiments has a single accident of any kind occurred.

AERIAL TORPEDOES.

Under-water torpedoes move slowly, and are turned aside by floating obstacles, currents and tides for which allowance cannot be made, and they are stopped by steel nettings. The aerial torpedo or projectile from the pneumatic gun goes straight and rapidly on its course through the air, turning neither to the right nor to the left, until it enters the water and strikes the under-water part of a vessel, which has no time to move out of its path, exploding with most disastrous effect.

These guns, manufactured by the Pneumatic Torpedo Company of New York city, now guard the defences at Sandy Hook, and are talked of to guard the entrance to the Chesapeake at Cape Henry, at which point Baltimore, Washington, Annapolis, Norfolk, Portsmouth, Alexandria, Newport News and Richmond should be protected.

FOR SEACOAST DEFENCE.

The seacoast gun is a breech-loading, smooth-bore, fifty feet in length and fifteen inches in diameter of bore. The breech-block is much lighter than in powder guns, and the breech mechanism is exceedingly simple, two motions being required to open it, the first consisting in turning the block through an angle of ten degrees and the second swinging it open. The carriage is mounted upon a circular racer ring, and can be traversed through 360 degrees. Upon the left side of the carriage is located a platform, upon which the gunner stands to sight and manipulate the piece. Within his reach is a hand wheel controlling the speed and direction of rotation of an electric motor located inside of the carriage, which serves to traverse and elevate the gun. In case any accident should happen to the electric motor or its connections the gun can be traversed and elevated by hand-power, two winch handles being provided for this purpose on the front and right side of the carriage. The electric motor is controlled by means of a rheostat located underneath the

platform. The accuracy at long range of the pneumatic gun permits of the use of a fine telescopic sight having cross wires in the focus of its eye-piece.

Compressed air is stored in wrought iron or steel reservoirs located in chambers under the gun platform. A large valve is located near the breech, which controls the admission of air into the barrel. The opening and closing of this valve is entirely automatic.

ON WAR VESSELS.

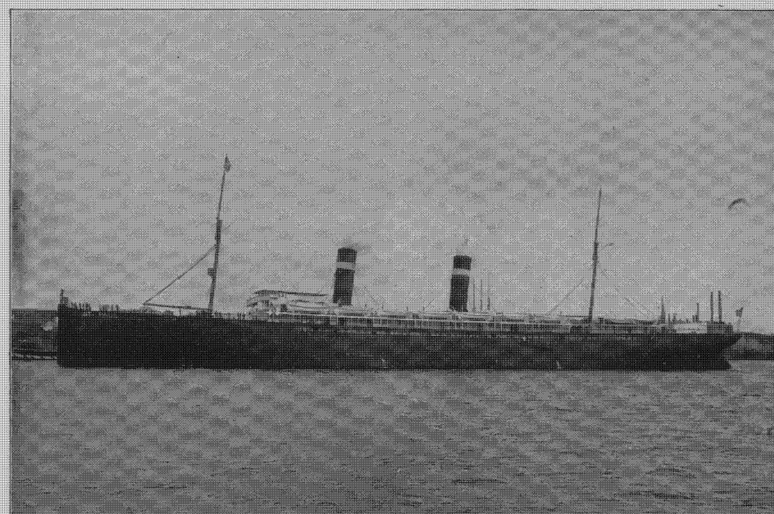
As a naval weapon the gun can be mounted on the deck of a vessel and protected by shields similar to the ordinary gun, or it can be placed in a turret. Guns of special types have been designed for mounting on board ship and in torpedo-boats, or on board vessels especially designed for them. The projectiles are usually carried in "revolvers" or revolving magazines. By this means they are well secured when the vessel is in a seaway and the loading is greatly facilitated. Ability to fire rapidly is of the greatest importance in time of action.

In mounting a battery of one or more pneumatic guns, it is necessary to establish at some distance from the gun an air-compressing plant. This plant should be located in some protected place, and it may be a mile away from the guns. In the same building an engine and dynamo can be located for supplying power to traverse and elevate the gun.

Two types of projectiles are used, one termed a full calibre, which fits the bore of the gun closely, the other a sub-calibre which is considerably smaller than the bore of the gun.

ROTATION OF PROJECTILES.

They all have ogival heads and long bodies. The gun being a smooth-bore, rotation is given to the projectiles as they move through the air by means of spiral vanes attached to the rear end of the projectile. Since the pressure used is only 1000 pounds per square inch, the walls of the projectiles are



SS. ST. PAUL.

made very thin, which gives a very large capacity for the explosive charge.

The full calibre projectile is about ten feet in length and has a capacity for 500 pounds of high explosive. The point is made of bronze, the body a steel tube three-sixteenths of an inch in thickness, and the base of bronze.

The possibility of controlling the range of the projectile with nicety renders it probable that the dynamite cruiser will play an entirely novel role in an attack upon a harbor protected by fixed submarine torpedoes; that is, she may destroy torpedoes by torpedoes. One hundred pounds of nitro-gelatine exploding under water will destroy torpedo-cases and blow up torpedoes existing anywhere within a radius of fifty feet.

A series of experiments have been made with these guns on the Vesuvius at Port Royal, S. C., which have proven highly satisfactory.

CHAPTER VIII.

HOW WE WILL SINK THE CRISTOBAL COLON.

BY A NAVAL OFFICER ABOARD THE RAM KATAHDIN.

We have in our navy one boat which alone could fight the whole much-vaunted, over-valued, self-confident Spanish navy. This vessel, boat, warship, ram, or whatever you may call it, is the deadliest weapon ever invented. It is absolutely impregnable to fire, and even dynamite glances off it as it would off a lady's hatpin. When stripped for action it lies almost on the water line, and its entire top rigging can be removed. Positively the only point visible is one solitary turret, which must be hit squarely like a bull's eye, or else the people inside would not know they had been struck. Anywhere else the shot and shell would roll off like pebbles off a slanting roof.

A NAVAL WONDER.

This wonderful ship is the ram Katahdin, and now that war is actually on this wonderful piece of marine architecture which has hitherto been kept silent by the government—in fact has never had a full crew upon her, can be mentioned. It is such a marvelous piece of work that the Holland submarine boat is not to be compared to it—no, nor twenty such boats. I would rather have the ram Katahdin to fight a war fleet than the whole flying squadron. Put me in command of the ram Katahdin and I will sink every vessel in the White Squadron without trouble, just as the Merrimac came near sinking the whole Union fleet.

This warship works, as its name indicates, by ramming. It

is a literal steel arrow, which jags its way into the side of a cruiser. No Indian arrow with pointed edge and poisoned tip could ever do the damage to a ship that this ram Katahdin does to the marine cruiser.

It is so deadly in its work that it is almost barbarous. Not even the ancient American ever conceived anything quite so deadly. The British navy at one time refused to accept such a hostile instrument of battle, and would not allow one to be built. Finally, however, it did, and turned out the British ironclad Camperdown, which was much of the same shape, although it lacked many of the works of the Katahdin. The Camperdown came in contact with the steel sides of the great battleship Victoria, with the result that the Victoria was instantly sunk. The Camperdown received a blow which sent her into dry-dock for months, and so the test was not considered successful.

The Katahdin, like the Camperdown, can deliver a blow that will sink any cruiser, but, superior to the Camperdown, it will not injure herself. That has been demonstrated by experiments of the Katahdin. The Katahdin has been run into docks of solid wood; it has been rammed against steel-covered posts; it has been driven into steel walls and subjected in every way to the severest tests known to the navy, and always without injury to herself.

A British naval official, commenting on the Katahdin, said that she was well worth the building, even though she should destroy herself, "for," said he, "the Katahdin cost only $1,000,000 and a cruiser costs $4,000,000. It is worth while, by mathematical computation, any day in the week to destroy a $4,000,000 cruiser with a $1,000,000 ram."

THE ATTACK.

The Katahdin works as the Britons of old fought—face to face and at short range. It sights a cruiser, approaches it until within striking distance and then strikes. She is clothed with armor sufficiently strong to deflect any projectile which would be likely to strike her massive steel sides as she ap-

proaches. She has high speed and such manœuvring powers that, as she dashes at an enemy, she can turn aside to avoid the shell. The gunner aboard the cruiser who is aiming at the Katahdin must constantly change his aim. The little ram is approaching rapidly, so that at each fire the gunner must change the angle of the gun. At the same time he must turn it from side to side to catch the Katahdin. She, meanwhile, is driving straight at the cruiser. When she has approached to within twenty feet she hurls her weight of 2,000,000 pounds at the enemy's ship, and it is safe to predict that the future of that ship is not worth writing.

The Katahdin was designed by Admiral Ammen, of the United States navy, who had such faith in her that he made no provision for a battery of any description. Since building, however, she has been mounted with four rapid-firing six-pounders. These are intended, however, only for defence. They are not sufficiently powerful to be of any service in an action with a cruiser, yet it is a cruiser which the Katahdin is designed to destroy.

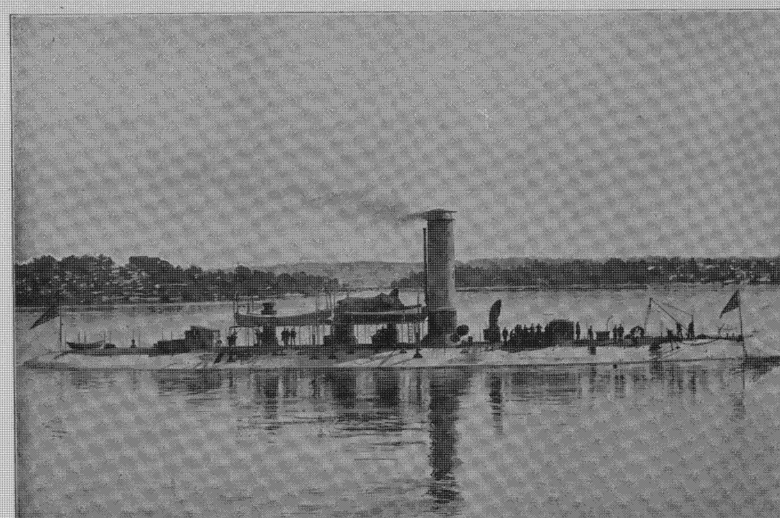
As soon as she has approached near enough to ram into the side of the cruiser she does her work and then darts away, leaving it to sink. If there are other cruisers she makes for them, they meanwhile sending their volleys of shot upon her steel sides. It is thus claimed that the Katahdflin could vanquish a whole fleet, and I cannot see why this should not be so. She strikes the cruiser at the water line at a point where it is positively weak.

DYNAMITE USELESS.

There is absolutely no projectile built which can pierce the upper part of an ironclad. With all our talk about dynamite and shells, we have not yet built a gun sufficiently powerful to pierce the steel sides of a warship above the water.

In this connection the remarks of the Chinese admiral, Yanghi, about the conduct of his vessel in the Japanese-Chinese war are interesting:

"The Tsen Tsing was struck 200 times above the water line



KATAHDIN (Ram).

by no fewer than 200 projectiles, but her armor was not damaged beyond a dent three inches deep. One shell, however, struck her below the water line and she was disabled."

This shows that the Chinese vessel stood 200 or more shells without showing more than a slight dentation, but it does not say how she would have acted if the attack had been made entirely under water, or upon her lower parts. It is possible to remedy the destruction that must come to a ship when attacked on her lower parts because of its weight. The ram Katahdin strikes below the water and does inestimable harm.

The Katahdin can be described as a twin-screw armor-plated vessel of 2050 tons displacement. Her original design called for a vessel 243 feet in length, but contractors studied the plans and proposed an addition of about eight feet, urging that the additional space would greatly aid the vessel's coal-carrying capacity. The change was approved by the Navy Department, and also was it authorized that a solid steel casting for the stem be substituted for the original head, which was originally proposed. The height of the conning tower was also increased.

The vessel measures now 250 feet nine inches in length, and has an extreme breadth of beam of forty-three feet five inches. When coaled and commissioned for service her mean draft will be fifteen feet. Her engines, which are of the vertical, triple-expansion type, are expected to give an indicated horse-power of 4800, and to develop a speed of seventeen knots per hour.

The Katahdin's coal supply is 175 tons. Her engines are in separate compartments and each is wholly independent of the other, so that if one engine is off or out of order another machine can be called into use. The propellers, which are three-bladed, are of manganese bronze.

The armor which protects the ship's curved deck has sufficient resisting qualities to deflect missiles from any but the highest-powered ordnance, such as are placed along shore, but too heavy for vessels. The hatches have armored plates, and the smokestacks and ventilators are protected by six inches of steel.

Now, do you doubt that we can sink the Christobal Colon, and if not, where is our weak point? Our armor is three times as heavy and when stripped we lay on the water edges so that we cannot be struck. We work under the water, and our weapon has escaped without a bayonet scratch. We are driven forward by electricity and steam—the most powerful known elements.

CHAPTER IX.

HOW BIG SHIPS ACT IN BATTLE.

DETAILED DESCRIPTION OF THE BOMBARDMENT OF MATANZAS —A SPLENDID EXHIBITION OF GUNNERY—SCENES ON BOARD DURING THE TERRIFIC ROAR AND DIN.

The correspondent of the Associated Press who was on the Flagship New York furnishes the following account of the bombardment of Matanzas, which took place on Wednesday, the 29th of April, 1898. It was the first battle of the war:

This engagement, the first in which the United States Navy has participated for about thirty years, occurred quite unexpectedly. The New York was lying about twenty miles east of Havana at 10.30 yesterday morning, when Rear-Admiral Sampson decided to steam to Matanzas. At the entrance to the harbor the monitor Puritan and the cruiser Cincinnati met the flagship. A stiff wind was blowing, and the waves poured over the low bow and stern of the monitor. At slow speed the flagship proceeded toward the harbor, the Puritan following half a mile astern and the Cincinnati about two miles to the westward.

SPANIARDS ERECTING BATTERIES.

Rear-Admiral Sampson and Captain Chadwick stood on the high bridge, carefully surveying forts which had had the temerity to fire on the United States torpedo-boat Foote. When about three miles from Punta Gorda, the extreme point of the eastern arm of the harbor, a long, yellow streak was seen on shore. It looked like a newly-erected earthwork. Closer inspection revealed a number of men clustered around the shore. Still the New York steamed slowly ahead until it

was ascertained without any doubt that the Spanish troops were busy in erecting what seemed to be a sand battery, and had already gotten several guns into position.

FIRING BEGINS.

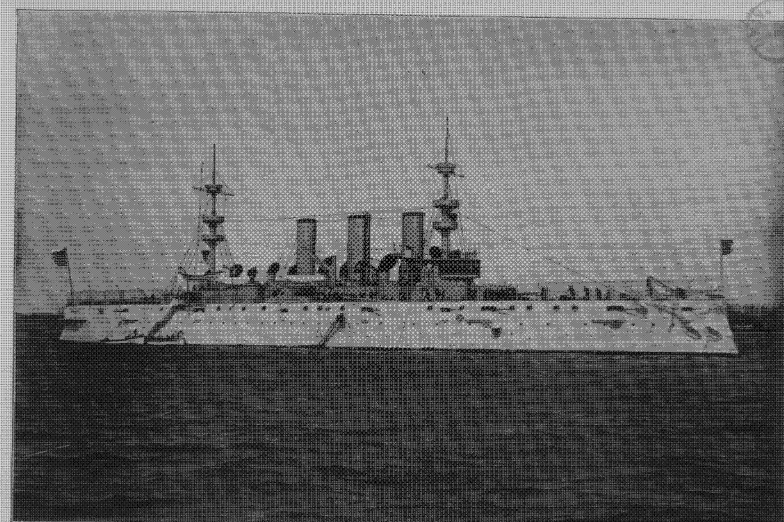
Rear-Admiral Sampson decided that this was detrimental to a pacific blockade. "General quarters" was sounded. The men rushed to their guns. When the New York was about 4000 yards from Punta Gorda her helm was put to starboard, and "commence firing" the bugler blew. Naval Cadet Boone, in charge of "Waist," the eight-inch gun amidships on the port side, had the honor of firing the first shot. The flagship shook from stem to stern as the first projectile aimed by the United States at the shore of Cuba flew from the muzzle of the big gun. This was at 12.56 P. M.

NOT A BAD SHOT.

Fifty pairs of glasses were leveled from the flagship at the shore. It seemed minutes before the yellow smoke cleared away, but in reality it was less than five seconds. Then a little cloud of dust was seen to rise at the right of the earthworks. For the first attempt at 4000 yards it was by no means a bad shot. Without the aid of glasses the objective point could be clearly defined. With a deafening roar the eight-inch gun in the forward turret let fly its iron missile. It landed high. The after turret came next with the same-sized projectile. A shout of delight went up from the flagship as a dense cloud rose slowly from the very center of the earthworks, showing how true had been the aim.

A REGULAR FUSILLADE.

Then from the entire port side a fearful fusillade was poured on the shore, the four turret guns firing almost simultaneously and the four-inch guns adding their smaller hail. When the smoke blew away Punta Gorda was dotted with dust



Speed, 21 Knots. NEW YORK (Armored Cruiser). Cost, $2,985,000.

clouds that looked like miniature geysers springing suddenly from the earth. Each showed where a shot had struck. At this stage the guns in the Qintas Da Recreo battery were observed to be firing on the flagship. This fort is on the eastward arm of the harbor, 7000 yards from where the flagship was lying. It is provided with four eight-inch guns. The flagship's fire was at once directed upon it. Up to this period the New York had been in the firing alone. Captain Harrington on the Puritan and Captain Chester on the Cincinnati had drawn up and were vigorously signaling for permission to fire. When this was reported to Rear-Admiral Sampson he said "all right; tell them to go ahead."

PURITAN AND CINCINNATI.

So, while the New York was commencing fire on Quintas Da Recreo, the Puritan took a position to the eastward and opened on the same point. The Cincinnati went to the westward and pounded a rapid-fire broadside into the earthworks on Punta Gorda. Occasionally shots from Quintas Da Recreo could be seen coming in the direction of the New York. All fell very short, and at no time threatened the ship. Only about ten shots are believed to have been fired from this battery during the whole engagement. However, there may have been more. It is possible that its guns may have been disabled, as two eight-inch shells were distinctly seen to land squarely in the fort. Its distance from the ship was so great and the smoke, which the wind took in its direction, so thick, that it was hard to judge the effect of the fire, and still harder to get good aim.

GUNS TURNED ON PUNTA GORDA.

For about five minutes Quintas Da Recreo got the full benefit of the port broadsides of the New York and Puritan. What its ultimate fate would have been is hard to tell had not attention been diverted from it by a shell from Punta Gorda

that whizzed over the New York and fell a little short of the Cincinnati.

Leaving Quintas Da Recreo to the tender mercies of the Puritan, which was still merrily banging away, Captain Chadwick put his helm to starboard until the port battery once more bore on the Punta Gorda earthworks. Another shell came from shore whizzing along over the flagship. "Too high, but a better shot than I thought they could make," said an officer.

SMOKE HIDES THE VIEW.

Then the Cincinnati and the New York poured shot into the yellow earthworks and the surrounding land until the smoke hid everything from view. Only one more shot from Punta Gorda was noticed. It fell short of the New York by about 200 yards. It was believed to come not from the earthworks, but from a field battery on the brow of a slight hill about half a mile further inland than the earthworks. In fact, it is doubtful whether any shots were fired from the earthworks after the two or three broadsides had been poured into them. What became of the soldiers seen on Punta Gorda is not known. Some declared they saw them running to the brow of the hill, where the field battery was thought to be stationed. But this, as well as the estimate of the enemy's number, which ranged from 400 to 4000, was purely supposition, distance and smoke preventing accurate knowledge.

BIG GAPS IN THE EARTHWORK.

At 1.15 P. M., when the bombardment was at its height, and after it had been in progress for nineteen minutes, Rear-Admiral Sampson ordered "cease firing" to be sounded. A few shots rang out from the Cincinnati and Puritan before they caught the signal. On shore all was quiet. Not a soul could be seen there, and there was no more firing. The earthworks a quarter-hour before had presented a fairly regular outline, but now they had a jagged appearance. Big gaps were plainly visible at Quintas Da Recreo, but there was

not a sign of life there. Admiral Sampson had effectually stopped the work on Punta Gorda. He had drawn the fire of the enemy and had discovered exactly the quality and location of their batteries, besides affording his three ships good target practice. Incidentally he had put the fear of American guns into Spanish hearts.

COULD HAVE CAPTURED THE TOWN.

It would have been perfectly feasible for these three ships, unaided, to have steamed past the fortifications right into Matanzas and taken it or shelled it at pleasure. The only risk run would have been from mines. However, Matanzas was not wanted, luckily for it. After satisfying himself that his object had been accomplished, Admiral Sampson headed back for Havana.

The Puritan and Cincinnati were left to look after Matanzas, and they will see to it that Matanzas is not the scene of much work on fortifications in the near future.

CINCINNATI NOT SATISFIED.

The readiness to assume this task can be judged from the fact that shortly after the signal "cease firing" had been given, Captain Chester asked permission to reopen. This was refused, Admiral Sampson evidently thinking that Matanzas had had enough for one afternoon. During the bombardment the New York's engines at intervals went slowly astern, keeping a steady range of 4000 yards on Punta Gorda and 7000 on Quintas Da Recreo, the machinery working perfectly, not only in the engine-room, but throughout the whole ship. This is especially true of the electric ammunition hoists and turret training gear, two of the most essential parts of a ship's equipment during action.

NAVAL POINT OF VIEW.

From the naval point of view few, if any, lessons were

learned from the bombardment, though the range at which the shooting was carried on was a satisfactory test of marksmanship. The distance, however, prevented the staff from ascertaining the effect of the heavy explosive projectiles on the earthworks. Quintas Da Recreo appeared to be an old style of fort, low, and lying near the water's edge. The battery was probably behind a recently-constructed sandwork.

WHAT IT DEMONSTRATED.

From the lay point of view, the bombardment appeared to demonstrate several things. It proved that the officers, from Rear-Admiral Sampson down, are perfectly cool in the face of danger and in action; that they have superb control over their men at the most exciting and trying moments, and that the latter are as steady and courageous when the guns roar and the shells whistle as when they muster to morning and evening quarters in time of peace. All these qualities are taken for granted by any naval officer. They are the postulates of his discipline. He would be surprised if it were otherwise.

A WARSHIP'S POWER.

In the second place, the bombardment gave an excellent, though at the same time a frightful illustration of a warship's death-dealing powers. Tremendous broadsides poured without cessation on the little streak of earthworks. Had a single ship been in the place where the shells fell it seems as if she would have been blown to bits before she could have returned the fire. When a 10,000-ton ship, usually as steady as a rock, shakes and trembles like a frightened child; when firmly-fitted bolts start from their sockets and window panes and woodwork are shattered; when the roar peals up from port and starboard and you feel your feet leaving the deck and your glasses jumping around your forehead, while a blinding, blackening smoke hides everything from sight, then it is you first realize the terrible power of a modern warship's batteries.

THE ADMIRAL A CENTER OF INTEREST.

Scenes of intense interest occurred on the flagship's deck during the bombardment. The center of attraction naturally was the forward bridge, where Rear-Admiral Sampson paced up and down, his long glass in hand, pausing now and then to watch the effect of the shots, impassive as if at sub-caliber target practice off the Dry Tortugas. Captain Chadwick was at his side, in the dual capacity of chief of staff and captain of the ship, equally calm and giving orders continuously regarding the direction of the fire and the handling of the ship. Lieutenant Stanton, assistant chief of staff; Lieutenant Commander Potter, executive officer of the ship, and Lieutenant J. Roller, the navigator, all were on the bridge and as busy as they could be. Three men were at the wheel, and the usual staff lookouts and signal boys were in their places. The conning tower, with its heavily-protected sides, was without an occupant. The whistling of a few shells could not drive the men who direct the fighting squadron from their unprotected point of vantage.

CHAPLAIN ROYCE READY.

Directly beneath the bridge on the superstructure, just aft of and slightly above the forward turret, stood Chaplain Royce, ready to give the last consolation. The chaplain and the three doctors were the only persons on board who sincerely hoped they would have no work to do. Near the chaplain stood Richard Harding Davis, representing the London Times; Ralph D. Paine, representing the Philadelphia Press, and the correspondent of the Associated Press. All others on board were at their regular stations, directing the gun crews, rushing up ammunition from below or standing patiently in the engine-room, waiting to back or go ahead as the telegraph signaled.

SPLENDID WORK OF THE JACKIES.

The way the jackies worked at their guns was splendid.

Many of them were stripped to the waist. The muscles stood out on their bare, tattooed arms. The perspiration ran down their faces, and mixing with the gunpowder, made grim streaks of black over their skin. When "cease firing" sounded disappointment was written visibly on all their faces. But the decks were quickly swept, the shrouds rehooked, the guns cooled and washed, and at dinner, when the band played "The Stars and Stripes Forever," there were few signs to show that the flagship New York had been in action for the first time in her career.

To those on board the flagship who had never before been on a warship when she was firing both batteries at once, and who had never heard the shells whistle through the air, the experience was not so bad as was anticipated. The noise of the guns deafened some slightly; but a timely application of wool to the ears deadened its effect, and, taken all in all, the shock of the broadside was not so great as had been expected.

A CHARACTERISTIC INCIDENT.

The most characteristic incident of the bombardment of Matanzas, and one that will go down in history as an instance of Yankee pluck, occurred in the sick bay on the flagship. Eleven sailors were lying there, listening to the shots, all eager to get on deck. Suddenly, as if moved by a common impulse, four of them sprang from their cots. One had malaria, two had grippe, and another a high fever; but their ailments were forgotten as they rushed out to their gun divisions and took their usual stations. Despite their entreaties to be allowed to stay, they were ordered back to the sick bay, to which they sorrowfully returned. It is hardly necessary to say that these four splendid specimens of "the man behind the gun" were not reported for breach of discipline.

CHAPTER X.

A SHIP IN ACTION.

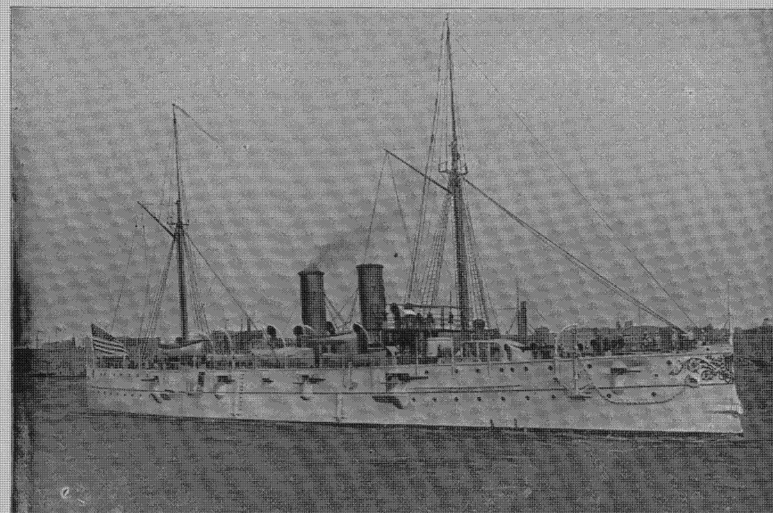
PERIL ON DECK AND BELOW AND ABOVE—PERIL FOR OFFICER AND MARINE—A TIME WHEN MEN DON'T WANT TO HIDE—MANY KINDS OF DEATH ABOUT IN A SEA FIGHT.

There has been a great amount of speculation lately as to the safest spot on a modern man-of-war in a sea fight. It has been asserted that the men below in the engine and fire rooms and in the bunkers are bound to have the best of it, not only because their duties keep most of them below the water line, and therefore out of the way of the raking of rapid-firing batteries, but also because they are shielded above by protective decks and all around by boiler and machinery protecting armor. The men who hold to this view forget all about the matter of torpedoes. Some other amateur sea fighters of the land, landly, take the view that the men on deck have a better show in a naval engagement, for the reason that they have a chance to swim for it and to be picked up by the enemy as prisoners of war if their vessel is sunk. They assume, of course, that the enemy is in the habit of picking up the castaway members of a defeated and submerged ship's crew. This is by no means a safe assumption. The enemy has often rescued and held as prisoners of war members of the crew of a beaten ship, but just as often has permitted them to keep right on swimming. So long a period has elapsed since there have been naval fights between entirely civilized powers that the two countries that next engage in battles at sea will have the responsibility of creating new rules of warfare, and one of the rules ought to cover this point.

In any event, speculation as to whether the deck force or the gang below will have the better of the bargain in a pitched

sea fight must be based almost wholly on theory. Captain McGiffin, the lion-hearted American naval officer whose observations on the sea fight of the Yalu form about the only practical basis for considerations about battles between modern ships, should surely have known something about the safe spot on board a naval vessel. He was on the deck of his ship, the best of the Chinese fleet, during the entire action on the Yalu. The writer asked him, soon after his return from China, if there were not moments during the fight in which he felt like making a run for it.

"Run where?" was McGiffin's inquiry. "I can't truthfully say that I felt like bolting for it at all during that mix. I didn't have time to think of anything like that. There was too much going on on deck, anyhow, and I didn't want to miss anything. The most cowardly man becomes quite forgetful of danger in a sea fight, as a rule. We had three men—lubberly coolies—who were found hiding away up forward on the berth deck when the fight was finished. The men who found them nearly beat them to death. A very great feeling of curiosity animates all hands in a battle at sea. Chinamen are about the least curious men in the world; yet the deck officers on my ship had great trouble in keeping the members of the black gang, the firemen and coal passers, and even the machinists, down below during the action. They kept poking their hands above the main deck, lifting off hatches for the purpose, to see how we were making out. On the whole I think the men down below are more nervous during a fight than the men on deck. They are a bit afraid of what they can't see. It's just like the fear of a man lying in bed in a dark room when he knows there is a burglar within a few feet of him. The men on deck can see the whole game, and the smoke and the roar infuse the devil of battle into them, and they simply don't care whether the ship remains on top or goes down. They literally enjoy the fun. A lot of our gunners were positively hysterical with delight. Some of them laughed like wild men. They muttered to themselves and howled like drunkards. Indeed, half the ship's company looked to me as if they were three parts drunk after the fight,



Speed, 19 Knots. CINCINNATI (Protected Cruiser). Cost, $1,100,000.

yet there was no grog. They reeled about, with silly, drunken expressions on their faces, although they knew we licked.

"But as for running, where would a man with any sense run during an action, even if he felt sure that the marines of his ship wouldn't shoot him down for cowardice? There is no sweet berth when your ship is cleared for action. On deck or below, fore or aft, every man's chance is about equal, all things considered. The commanding officer has no better show than the rawest landsman. I'd rather be on deck any time in a fight. I don't believe I could be induced to take an engineer's trick during an action. Not that an engineer or any of his gang stands in any more danger than the deck force engaged in fighting the ship, but the uncertainty that chokes the man below is wearing, as all of our engineers and some of the Japanese engineers after it was all over told me."

Common and perfectly equal as the danger in which all hands on board a modern man-of-war unquestionably stand during a fight, there are, of course, some stations that appear to be more ticklish for the men assigned to them than others. For example, there is not a sea soldier in the United States Marine Corps today who is not figuring on the insignificant show he will probably have for his life if, in the event of his ship's getting into action, he is detailed with a picked few of his mates to man the rapid-firing guns in the fighting tops. At first glance the fighting top of a modern ship of war appears to be the most dangerous spot on the ship fore or aft in case of action. There has never been any good opportunity to test this, for fighting tops (rightly called military masts) are of comparatively recent developments, and during the China-Japanese naval engagement no systematic attempt seems to have been made on either side to raze the fighting tops to the decks or into the sea.

The bluejackets who are stationed in the magazines during a sea fight are certainly no better off than their mates, either above or below decks. Each commander in a naval battle knows precisely where his foe's magazines are located, and there is likely to be some tall aiming for magazines in the next naval war. To those who are unfamiliar with the general

expertness of modern great gun marksmanship and the extraordinary accuracy of some of it, it might seem pure foolishness for a gunner to make an attempt to hit any especial part of an enemy's ship at a range of several miles. Those who think in this way, however, have only to be referred to the bit of marksmanship performed by one of the 13-inch crews of the battleship Indiana the other day. This crew, using service projectiles and charges in practice, put two 13-inch shots right through the same hole. This sort of marksmanship is by no means uncommon in the United States Navy, the standard of which for great gun expertness is as high as any navy in the world. It is no unusual thing for gunners of American men-of-war engaged in big gun practice to tear the canvas targets to ribbons, at the very longest effective ranges, before the practice is well begun. This being the state of great gun marksmanship at the present time, it is reasonable to suppose that the men in the magazines in a sea fight should have no especial cause for being happy above their fellows over their stations. One great gun shell plumped well over a magazine (even though the magazines be all far below the water line) is likely to cause enough trouble to induce the magazine men to wish they were on deck, if they have a chance to think at all. Moreover, there is such a thing as a heavy projectile penetrating an armored ship below the water line, as was proved on the Yalu, and if this should happen at a point on the ship where a magazine chanced to be located the men hauling ammunition and manning the hoists in the same would never know what had happened to them. Then there is always a likelihood of shells exploding on deck and bits finding their way through the open magazine hatches—and such a thing would be dangerous enough. The magazine men, moreover, have to work in practical darkness. Magazines on modern men-of-war are, of course, fitted with no standing lights of any sort. In times of peace, when the gunners' mates and inspecting officers wish to examine the interiors of magazines, they carry portable incandescent electric lights with them, but in handling loose ammunition during actual fighting even these portable electric lights would be

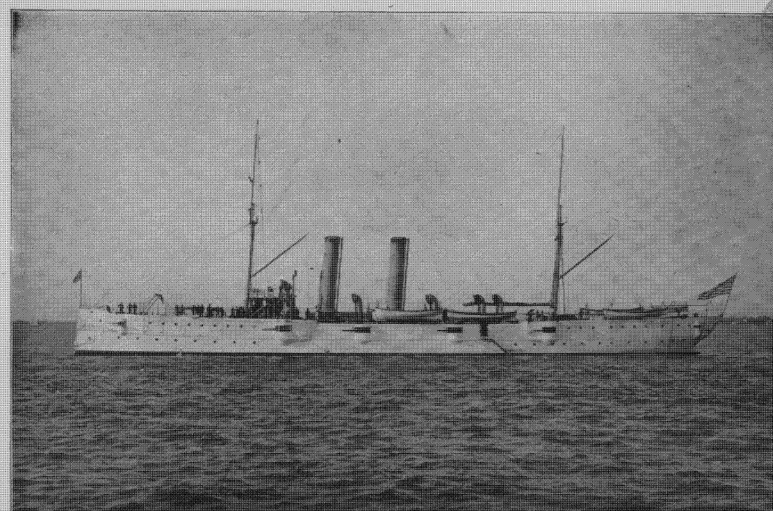
deemed dangerous, so that the magazine men would no doubt have to grope for it and take out their nervous curiosity as to what might be happening to their ship or fleet in wondering.

The officer would have no advantage whatever over the enlisted man in the matter of greater safety in a modern naval engagement. The sword-carrying men with the range-finders were lopped off with complete impartiality in the Yalu fight. An officer in command of a gun has even a bit the worst of the chance in comparison with the men handling the gun, for in order to get a line on the enemy he must necessarily expose himself to the enemy's scientific rapid-fire play, while the gunners have the protection of the gun shields and barbettes. Even the commanding officer is no better as a war risk than the humblest mess attendant in a fight. His station on modern ships will generally be in his ship's conning tower, and, well as conning towers on ships of war today are protected, eminent naval authorities haven't much faith in their invulnerability. Conning towers are necessarily in exposed spots—almost always away forward, beneath where the bridge ought to be, but isn't, when the ship is cleared for action—and gunners of the enemy are naturally expected to do what they can toward sending the commanding officer of an antagonistic ship into the next world before his time.

The man in the bunkers, viz., the humble coal passer, is likely to have a dismal, unsatisfactory time of it during the progress of a fight. He sees absolutely nothing, but what he does not see is more than atoned for by what he hears. Any man who has listened to the intonation of great guns during target practice from the shelter of a half-empty coal bunker is likely to remember the twenty times amplified thundering that threatens to rip his ear drums in twain. Theoretically the coal passer is supposed to shovel buckets full of coal and trundle them along the trolleys in the mellow light of many 16-candle incandescent lamps, and as a matter of fact all modern ships' coal bunkers are lighted. But the writer; who has crawled through the bunkers of many a modern man-of-war, American and foreign, has found that standing electric bunker

lamps rarely illuminate. The glass around the wires is smashed in the process of coaling ship, and, of course, the lamps do not work. Naval constructors are still trying to find some scheme to illuminate bunkers. The coal passer, standing his watch in the bunker of a ship in action, then, has the additional gloom of darkness to fight, unless he violates a rigid regulation by carrying an open light into his bunker. He does not know when an armor-piercing shell is going to pass directly through the bunker he is working in, and altogether his station in a fight is not a desirable one. Nor has the fireman or the water tender a very cheerful station. Both of these members of the black gang, of course, are in the boiler-rooms, and they have perpetually before them the possibility of a great shell ripping its way through a boiler, thus insuring them a death by scalding. The oiler is another man of the black gang who has a title to feel nervous when his ship is fighting, for he is always more or less tangled up in the machinery, apparently endeavoring to see how near he can approach death without actually compassing his own, and in the event of a shot dropping through the deck and among the intertwisted masses of machinery he is liable to be torn to pieces by the same, "racing wild," as the engineers call it, even if he is not done for by the explosion.

"The soft spot," as an old gunner's mate put it, "is about five fathoms beneath her, in a diving suit."



Speed, 17 Knots. MONTGOMERY. Cost, $612,500.

CHAPTER XI.

BIG GUNS.

The big gun in this present war with Spain promises to be the decisive factor. Never before has a great 13-inch gun had an opportunity in an actual engagement to show what it can do. All the nations of the earth are looking on agape at the commencing struggle, and students of the art of war expect to learn a lot of useful lessons from its events.

Wonderful in its destructive effect and marvelous in its construction is the most powerful type of modern weapon, a 13-inch gun. This is the biggest kind of gun that is carried by any of our ships. The Indiana has four such terrors, and four likewise have the Massachusetts and the Oregon. It is forty feet long, weighs sixty-one tons, costs $50,000, and cannot be made in less than a year. To load it requires 550 pounds of powder for each shot, and it can be fired once in five minutes.

It throws a conical steel shell weighing 1100 pounds a distance of twelve miles. At 1500 yards one of these projectiles will penetrate twenty-three inches of solid steel. The projectile at 2500 yards has a smashing energy of 25,000 foot-tons, sufficient to lift two vessels like the Indiana one foot.

One of the Indiana's big guns is able to deliver crushing blows as far as the target can be seen. The distance for effective fighting does not exceed two miles, because, owing to the curvature of the earth, the hull of the vessel aimed at is apparently below the water level when she is further off. The gun is worked entirely by hydraulic pressure, and the exertion needed to load, aim and fire it is scarcely more than is required to shoot a self-cocking revolver.

A gun of this kind discharges two sorts of projectiles—the bursting shell and the armor-piercing shell. The former is

of cast steel, loaded with gunpowder, and is so constructed as to explode on impact.

The armor-piercing shell is of forged and tempered steel, extremely hard at the point, so as to pass through a dozen inches or more of Harveyized armor plate without being broken up. This kind of projectile is designed to make holes through the armor plates of a ship, whereas the explosive shell is meant to enter through unarmed or lightly-armored parts of a vessel, bursting inside and creating havoc. It should be remembered that even a battleship carries heavy armor only over its middle part or vitals, where the machinery is, and this protection extends only from four feet above the water line to four feet below it.

An armor-piercing shell for a 13-inch gun costs $500. Traveling at the rate of nearly half a mile a second when it leaves the muzzle, nothing can resist its terrific impart, if it strikes fairly, at a distance of a mile. The most that can be expected of the armor plate is that it will not split into pieces. When the projectile passes through, the corn-pith, with which the cofferdam behind the armor is filled, chokes up the hole and prevents the entrance of water. In actual sea-fighting, however, armor is rarely struck so true and fairly as to penetrate it; it is more than apt to divert the course of the shell, which glances off.

In the case of a bursting shell, the armor causes it to explode outside harmlessly. A bursting shell that enters a vessel is dangerous in four ways; it makes a hole, it sets fire to woodwork, it throws splinters about and it liberates suffocating fumes.

The Pelayo, which is Spain's only real battleship, and which is now prowling about the North Atlantic, has no guns bigger than her two 12-inch breech-loading rifles. These are formidable weapons, but they are very inferior to the 13-inch rifles of the American battleships. The latter can strike as hard and as penetrating blows at 2500 yards as the guns of the Pelayo can deliver at 1000 yards. In fact, the difference is even greater, inasmuch as a shell from one of the 12-inch guns of the Pelayo strikes with a force of 21,000 foot-tons at

1000 yards, whereas, as stated above, a projectile from one of the Indiana's great rifles delivers a blow of 25,000 foot-tons at 2500 yards.

The Indiana carries thirty rapid-fire guns and several machine guns in addition. The typical rapid-fire gun is a rifle with a peculiar breech mechanism, which enables it to be fired very fast. In caliber it runs all the way up from the diameter of a one-pound shell to six inches.

A six-inch rapid-fire gun throws in actual service three or four 100-pound projectiles every minute. The shell for a five-inch gun of this type weighs fifty pounds, and the rate of fire is slightly greater. A three-inch rapid-fire gun throws a 36-pound shell every eight seconds, with a range exceeding four miles. The range of the six-inch gun is more than six miles.

The shells used for weapons of this kind are of brass and conical in shape. More accurately speaking, they are cylindrical and pointed at the front end. The projectile for a six-inch caliber is about five feet high.

From the figures here given it may easily be imagined what a storm of projectiles can be directed at any target at the same time. It is said that in the fight between the Chinese and Japanese fleets at Yalu the vessels engaged were struck so often that they actually turned gray. The shells, bursting as they struck, killed every exposed man and set the woodwork of the ships on fire on all sides. At one time the Chinese flagship was on fire in three places, and all the boats on most of the vessels were smashed to splinters early in the contest.

On board the battleship commanded by Captain McGiffin, an American officer, there was an ominous silence in the military foretop almost at the beginning of the fight. The machine guns there mounted discontinued their fire, and it was subsequently found that a single shell had killed all of the six men in the top.

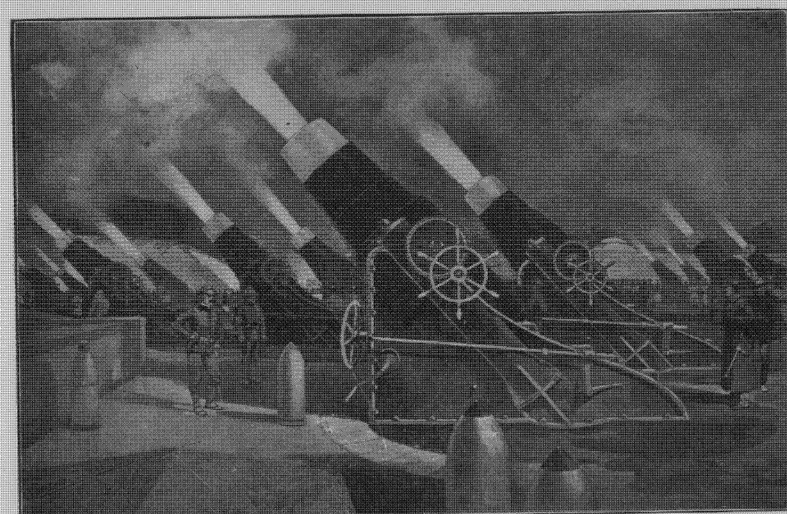
It is estimated that under average circumstances in a sea fight under modern conditions one-third of the officers and

men will be killed and wounded on a warship during the first fifteen minutes of the action.

Machine guns of the Gatling type are usually placed in the military tops. They are bundles of rifle barrels, into which cartridges are fed through a hopper. They discharge a continuous stream of ordinary rifle bullets at the rate of about 700 a minute. The purpose of the machine gun is not to damage a ship, but to kill off exposed men.

Doubtless there is no position on board of a modern fighting ship so dangerous as that of the men who operate these guns in military tops, inasmuch as they are comparatively exposed and sure to be a target for the rapid-fire guns of the enemy. In the present war with Spain the Americans possess an enormous advantage in their superiority of marksmanship, and, in the opinion of experts, where vessels of equal power are opposed, the boilers of the Spanish ships will be quickly blown out and their magazines exploded by the concentrated fire of the great guns of the Americans.

A type of gun that is wholly an experiment and as yet untried is the pneumatic aerial torpedo thrower, as it is sometimes called. The Vesuvius carries three of these powerful weapons, each of which is fifty-four feet long and of 15-inch calibers. These guns throw shells containing 100 or 200 or 500 pounds of nitro-gelatine, and they have an accurate range of two miles. One of these projectiles is surely fatal to a ship if it strikes within thirty feet of the vessel, or even fifty feet in the air above it.



A MORTAR BATTERY IN ACTION, DEFENDING A HARBOR.

CHAPTER XII.

PAY OF ARMY AND NAVY.

HOW THE GOVERNMENT REMUNERATES THOSE WHO FIGHT ITS BATTLES ON LAND AND SEA.

The Hull bill, recently enacted into law by Congress, will increase the regular army of the United States on a war footing to 61,000 men, of all branches of the service. With the 125,000 volunteers for whom the President has called, and the 13,000 additional, who will constitute "special commands," as provided in the bill to be reported this week, the government will have 199,000 well-equipped soldiers for the war with Spain.

Not only has the government prepared to put a mighty army in the field, however, but it has also enlisted thousands of men for the navy. To maintain the land and naval forces which are required against even so weak a power as Spain involves the expenditure of vast sums of money. One of the most important items will be the pay of the army and navy. Those who contemplate enlistment with the volunteers, the land and naval militia who will be mustered into the service of the United States, and those who will offer themselves as recruits for the regular army will be interested in knowing what the government will pay them for fighting its battles. The pay of the regular army on a monthly basis is as follows:

PAY OF THE ARMY.

Second lieutenant, not mounted	$116 67
5 years' service	128 33
10 years' service	140 00
15 years' service	151 67
20 years' service	163 33

Second lieutenant, mounted	125 00
First lieutenant, not mounted	125 00
Chaplain	125 00
5 years' service	137 50
10 years' service	150 00
15 years' service	162 50
20 years' service	175 00
First lieutenant, mounted	133 33
5 years' service	146 67
10 years' service	160 00
15 years' service	173 33
20 years' service	186 67
Captain, not mounted	150 00
Regimental adjutant	150 00
Regimental quartermaster	150 00
5 years' service	165 00
10 years' service	180 00
15 years' service	195 00
20 years' service	210 00
Captain, mounted	166 67
5 years' service	183 33
10 years' service	200 00
15 years' service	216 67
20 years' service	233 33
Major	208 33
5 years' service	229 17
10 years' service	250 00
15 years' service	270 83
20 years' service	291 67
Lieutenant-colonel	250 00
5 years' service	275 00
10 years' service	300 00
15 years' service	325 00
20 years' service	333 33

Colonel	291 67
5 years' service	320 83
10 years' service	350 00
15 and 20 years' service	375 00
Brigadier-general	458 33
Major-general	625 00
Lieutenant-general	916 67
General	1,125 00

PRIVATES.

Privates in the artillery, cavalry and infantry receive for the first two years after enlistment $13 a month. The third year they receive $14 a month; the fourth year $15 a month; the fifth year $16 a month. The re-enlisted pay is $18 a month after five years' service, $19 after ten years, $20 after fifteen years, and $21 after twenty years, with $1 per month additional for each subsequent period of five years' continuous service. Privates of the first-class, engineers and ordnance, get $17 a month for the first two years of enlistment, with proportionate increases for continued service; musicians in all branches of the military service get $13 a month on enlistment, and an increase after the second year. Blacksmiths and farriers in the cavalry and artificers in infantry and artillery enlist at $15 a month for the first two years, and this is also the pay of corporals in cavalry, artillery and infantry. Corporals in the engineers and ordnance get $20 a month, with increases up to $28 monthly after twenty years' service. First sergeants of artillery, infantry and cavalry get $25 a month for the first two years; sergeants get $18 a month, and sergeants in the engineers, ordnance and signal corps are paid $34 a month. The first sergeant of the signal corps gets $45 a month.

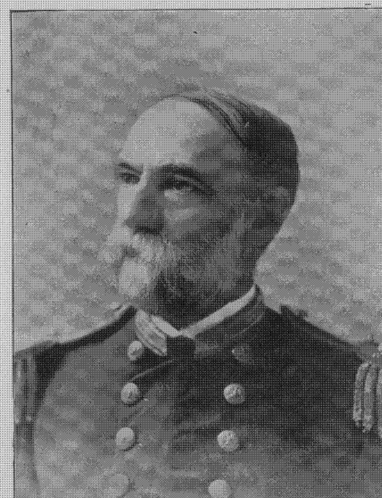
The chief trumpeter of a cavalry regiment enlists at $22 a month; the principal musician in artillery and infantry is paid the same; the saddler sergeant of a cavalry regiment gets $22

for the first two years; the chief musician in artillery, cavalry and infantry regiments gets $60 a month. Sergeant-majors and quartermaster sergeants are paid $23 a month; sergeant-majors and quartermaster sergeants in the engineers get $36 per month. The pay of all the above increase proportionately after the second year.

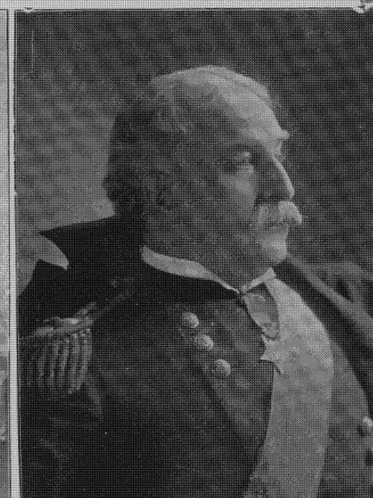
The pay of senior veterinary surgeons is $100 a month; of junior veterinary surgeons, $75 a month; of hospital stewards. $45; of privates in the hospital corps, $18; of hospital matrons. $10 a month.

PAY OF NAVAL OFFICERS.

PER ANNUM.	At sea.	On shore duty.	On leave or waiting orders.
Rear-Admirals	$6,000	$5,000	$4,000
Commodores	5,000	4,000	3,000
Captains	4,500	3,500	2,800
Commanders	3,500	3,000	2,300
Lieutenant-Commanders:			
First four years	2,800	2,400	2,000
After four years	3,000	2,600	2,200
Lieutenants:			
First five years	2,400	2,000	1,600
After five years	2,600	2,200	1,800
Lieutenants, Junior Grade:			
First five years	1,800	1,500	1,200
A.ter five years	2,000	1,700	1,400
Ensigns:			
First five years	1,200	1,000	800
After five years	1,400	1,200	1,000
Naval Cadets*	500	500	500
Mates	†900	†700	†500
Medical and pay directors and medical and pay inspectors and chief engineers	4,400	....	....



ADMIRAL SICARD.



GENERAL MILES.

Fleet surgeons, fleet paymasters and fleet engineers	4,400	....	....
Surgeons, paymasters and chief engineers:			
First five years	2,800	2,400	2,000
Second five years	3,200	2,800	2,400
Third five years	3,500	3,200	2,600
Fourth five years	3,700	3,600	2,800
After twenty years	4,200	4,000	3,000
Passed assistant surgeons and past assistant paymasters:			
First five years	2,000	1,800	1,500
After five years	2,200	2,000	1,700
Passed assistant engineers:			
First five years	2,000	1,800	1,500
Second five years	2,200	2,000	1,700
Third five years	2,450	2,250	1,900
Fourth five years	2,700	2,350	1,950
Assistant surgeons, assistant paymasters and assistant engineers:			
First five years	1,700	1,400	1,000
After five years	1,900	1,600	1,200
Boatswains, gunners, carpenters and sailmakers:			
First three years	1,200	900	700
Second three years	1,300	1,000	800
Third three years	1,400	1,300	900
Fourth three years	1,600	1,300	1,000
After twelve years	1,800	1,600	1,200

* After leaving Academy, at sea, in other than practice ships, $950 per annum.

† Mates who were in the service August 1, 1894, are entitled to receive annual pay at the rates following: At sea, $1,200; on shore duty, $900; on leave or waiting orders, $700.

PETTY OFFICERS.

The monthly pay of chief masters-at-arms is $65; of chief boatswains' mates, chief gunners' mates, chief gun captains and chief quartermasters, $50; of chief machinists $70, and chief carpenters' mates, $50; of chief yeomen $60, of apothecaries $60, and of bandmasters $52; of masters-at-arms, boatswains' mates, gunners' mates, gun captains and quartermasters of the first class, and schoolmasters, $40; machinists of the first class, $55; boilermakers, $60; coppersmiths and blacksmiths, $50; plumbers and fitters, $45; sailmakers' mates, carpenters' mates, first class, and water tenders, $40; first musicians, $36; yeomen, first class, $40; masters-at-arms, boatswains' mates, gunners' mates, gun captain and quartermasters, of the second class, $35; machinists, second class, $40; oilers, $37; carpenters' mates, second class, printers and yeomen, second class, $35; masters-at-arms, gunners' mates, quartermasters, carpenters' mates and yeomen of the third class, $30; coxswains and painters, $30; seamen gunners, $26. Seamen, first class, $24; apprentices, first class, $21; firemen, first class, $35; musicians, first class, $32; seamen, second class, $19; apprentices, second class, $15; firemen, second class, $30; shipwrights and sailmakers, $25; buglers and musicians of the second class, $30; seamen of the third class—landsmen, $16; coal passers, $22; baymen, $18; apprentices, third class, $9.

MESSROOM SERVICE.

Stewards to commanders-in-chief and commandants, $45; cooks for same, $40; cabin stewards, $37; cabin cooks, $32; wardroom stewards, $37; wardroom cooks, $32; steerage stewards, $25; steerage cooks, $22; warrant officers' stewards, $24; warrant officers' cooks, $20; ship's cooks, first class, $35; second class, $30; third class, $25; fourth class, $20; mess attendants, $16.

Any person who has received an honorable discharge after three years' service and re-enlists within three months after discharge for three years, will receive an increase of $1 a month to the pay prescribed for the rating in which he serves for each consecutive enlistment.

CHAPTER XIII.

THE NEW AND THE OLD NAVY.

WILLIAM C. WHITNEY AND CAPTAIN MAHAN GIVEN THE CREDIT FOR THE WONDERFUL IMPROVEMENT IN OUR FIGHTING SHIPS—TRAINING OF OUR NAVAL OFFICERS AND THEIR DUTIES ABOARD SHIP.

The American navy is making history. It has placed the United States among the powers, and all Europe is wondering at the completeness and effectiveness of its work.

To the vast majority of Americans the navy was little thought of prior to this war. Confident in the great resources of the States, and never considering the possibility of a foreign conflict, Congressmen from the interior fought appropriations for ships and men to form a marine fighting force, believing such money would be uselessly expended. But in spite of this opposition and the lack of interest shown by many citizens of the republic, the United States fleet of warships has slowly grown, until now it is more than able to cope with the European power it has been necessary to meet in conflict.

The main credit for this is due two men—William C. Whitney and Captain Mahan. The former sowed the seed that brought forth the navy of today; he was the father of the white squadron, which in turn is the mother of the fleet that must bear the brunt of the battles in the present crisis. It must have been gratifying to him when the news of the battle

CAPTAIN HIGGINSON,
1st Class Battle Ship "Massachusetts."

COMMODORE SCHLEY,
In Command of Flying Squadron.

at Manila was received to read as being in the thick of the fight the Baltimore, Boston, Raleigh, Bennington—all ships that he had planned, and whose lines were laid under his direction.

Captain Mahan's influence was with his pen. He raised a standard for the personnel, and showed the future that was in store.

It was but twenty years ago that the old wooden ship Pensacola was the strongest vessel in our navy. She had beautiful lines and looked a picture under canvas, but as for a fighting machine she was worse than useless. She steamed into the harbor of Calao, Peru, one day and the Americans who saw her were ashamed that their government should have such a representative abroad, and so, no doubt, was her commander, Capt. George Brown, now a Rear Admiral, retired. Lying in this bay was Her Majesty's ship Triumph, with sides of steel ten inches thick; at another anchorage was the German ironclad Hanse, equally as powerful; the Peruvian and Chilian armored vessels were also near. And the man-of-war that bore the stars and stripes was a wooden vessel that could proceed faster under sail than under steam.

Had the war with Spain been declared at that date defeat after defeat would have come to this country for years and years; in fact, until a navy could be built.

Even after some of our new ships had been launched little Chili was in a position to insult us without much fear of the consequences.

Now all is different, and when next spring that excellent work on the navies of the world—Lord Brassey's "Naval Annual"—appears, it will be seen that the United States is the fourth, if not the third, naval power in the world.

There has been much said in the public prints about the army not being ready for this emergency, but never has a word of similar criticism appeared concerning the navy. Ships, men and guns have been in a position for effective work since the day Spain tendered Minister Woodford his passports.

Dewey, far off in the Pacific, was as ready to give battle as though he had just left a home port, although when his ships left the Pacific coast of America no one had a thought but they were going on a cruise as peaceful as the thousands of cruises taken by ships bearing Old Glory in foreign waters since the war of 1812. It has always been the policy of the American navy to be ready for any emergency, and to that policy, as much as to anything, is due the splendid victory in Manila bay.

It is generally recognized, even by foreigners, that the officers of the American navy are a superior class of men to those of any other nation. This is due to the fact that no favoritism, no influence, can be brought to bear to secure anyone a place on board an American warship. Every officer is practically born into the service, going into the navy at such an age that even his opinions can be molded by those in authority over him. The exclusiveness of the sea arm of the service has often been criticised, and an effort has been made to allow the commissions to issue to men who have not been through Annapolis, but who can pass required examinations. But the bars have never been let down since the civil war, as they have been in the army, and all the men who direct affairs on the United States vessels are graduates of that world-famous naval academy, with the exception of a few high in rank, who showed their merit during the struggle between North and South.

Four years at Annapolis, followed by two years at sea as a naval cadet, such is the apprenticeship that each young man must serve before he can hold even the slightest responsible position on board an American man-of-war. The many examinations that are compulsory during the period result in the weeding out of those who would prove a detriment to the service, and it is truly a survival of the very fittest.

The majority of Congressmen have established the rule that appointees to Annapolis must pass competitive examinations, so that the lad who is selected to go to the naval school is

usually the one most fit to represent the district of his State. After six months there is a rigid mental examination at the academy, and before that there is one of a physical nature. Then, each year, tests of even greater severity are applied, and the test made after the candidate for a berth for naval officer has served his two years' term as a naval cadet is the severest of all.

Just what each officer is expected to do while on board ship is told below:

Rear-Admiral—Commands a squadron, and through his flag lieutenant directs the movements of the ships in the fleet. He never interferes with the direct working of the ship he is on. He will order such ship to steam a certain course or to commence action, just as he orders by signals other vessels of the squadron, but the matter of how it shall be done is left to the captain. A rear-admiral has as aids a flag lieutenant and a secretary. Each of them are officers of the navy, usually ranking as lieutenants, and are chosen by the rear-admiral.

Commodore—Commands a fleet, as does a rear-admiral. Such fleet, however, is smaller in size. His aids are the same as a rear-admiral's.

Captain—Commands the larger vessels of the navy, such as the battleships, the monitors and the large cruisers. He is supreme on board his vessel.

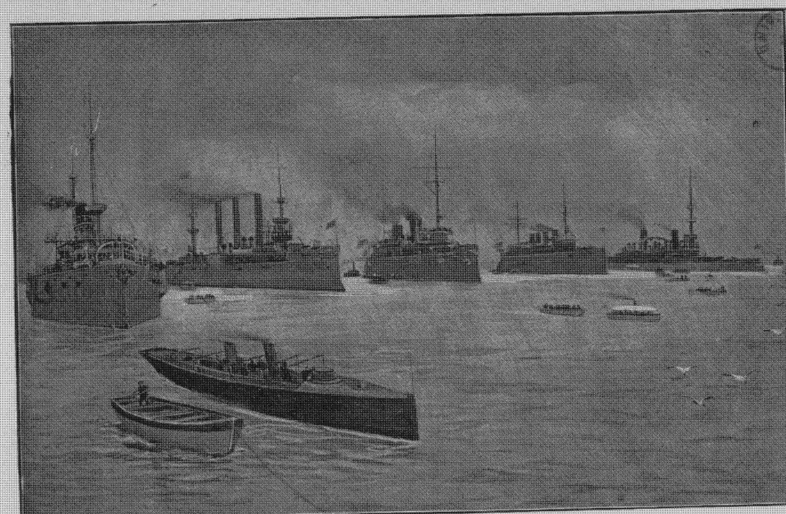
Commander—Commands ships of the second rate, such as unprotected cruisers and other craft.

Lieutenant Commander—Is either the executive officer under a captain or commander, or is placed in command of a still smaller craft. In the former case he is the captain when the commanding officer is on shore. While in action or during a storm the captain issues all his orders through his executive, who stands by his side, speaking-trumpet in hand. The executive is responsible for the appearance of the ship. He is the one who orders the painting and sees that it is done correctly. He inspects the various properties on board and orders such supplies as are needed.

Lieutenant—He may be in one of the four positions—executive officer, navigator, senior watch and division officer, or even a commanding officer. When an executive officer, his superior is generally a commander. When a navigator he is second in rank to the executive officer, and enjoys one of the pleasantest billets in the navy. The navigator on ship while at sea, and, for that matter, while in port, is relieved from all duty save that which the name implies. In his office are kept the charts and the sextants, the ship's chronometer and corrected compass. He takes sights at noon, at 4 o'clock and maybe at night, and he traces on the chart the ship's course. He keeps the log (which is a history of the voyage), and that is all he is required to do. When approaching a coast he remains on the bridge and directs the course. When the ship is in action he is again to be found on the bridge. He must know every shoal, every reef and every buoy, and be able to thread any waters in any part of the world. The phrase "senior watch and division officer" means that he is the ranking officer (providing he is not executive officer or navigator) of those who stand watch on the bridge while the ship is at sea, or on deck while in port, and also he has command in action of the largest gun or the heaviest battery.

Lieutenant, Junior Grade—On ships where the captain is a lieutenant commander, lieutenants of the junior grade may be found occupying the positions of executive or navigator, but on the larger vessels the junior lieutenants are watch and division officers merely.

Ensigns—They are, as a general rule, watch and division officers, although on the very small ships they occasionally occupy higher positions. In the case of the capture of prizes during war an ensign is usually put on board to take the vessel into port, and in such case he becomes a captain for the time being. That reminds the writer that the first prize of the war was brought into Key West by Ensign William Carey Cole, who is one of the officers in the navy hailing from Chicago. Ensign Cole was detailed to the Buena Ventura from



2d Class Battleship "Texas." Protected Cruiser "Minneapolis." 1st Class Battleship "Massachusetts."
Armored Cruiser "Brooklyn." Protected Cruiser "Columbia."
THE FLYING SQUADRON AT HAMPTON ROADS.—Drawn by Carlton T. Chapman.

the Dolphin, and took her to Key West, where she was turned over to the United States Marshal.

The above applies to officers of the line, and below are given briefly the duties of the officers of the staff:

Chief Engineer—Has control of all the machinery, that which propels the ship and that which controls turrets and conning tower. He is responsible to the captain alone, and reports to him. He keeps statements of coal purchases and coal burned, also of oils and other necessaries, which statements are forwarded to Washington at stated periods.

Paymaster—Has control of the ship's safe, in which usually is carried a large sum of money in gold, in order that any emergency may be met. Has to pay all hands, from captain down to messenger, at stated intervals, and see that all bills contracted by the ship and persons on board are paid before the vessel leaves a port. His books are quite complicated, and there is a system of reports to the department equally so, and his two assistants are kept busy.

Surgeon—Chief of the hospital staff. Oversees the sick call every morning, and must always be ready to respond to a summons.

Captain or Lieutenant of Marines—The marines are the police of a ship. They are uniformed like soldiers and are armed with rifle and bayonet. In port they stand guard at the gangways to see that objectionable characters do not come on board, and to arrest any sailor who may return from leave under the influence of liquor. It is this latter duty that has caused the bitterness between the marines and the sailors that dates back for a century. At sea the marines are drilled for an hour every morning, but the life they lead is a lazy one, on the whole, unless they happen to be assigned to a ship whose captain is a martinet, and in such case they frequently are made to scrub decks, haul the lead line in board and perhaps do menial work. The officer in command of the marines is a graduate of Annapolis who has elected upon graduation to follow this branch of the service. He has no other duty on

board than to look after his men and see that they are properly drilled.

A transformation comes over a man-of-war the moment her anchor is at the peak. Even the technical terms by which some of the officers are called change when the ship leaves port. For instance, while a war vessel is in harbor the officers who stand watch are termed "officers of the deck," but when under way they become "watch officers."

The officer of the deck is on duty for a day or two at a time, depending upon the regulations of the ship he is on. But his duty is of a lax nature and he can pass most of the time in the ward room if he wishes. His principal duty consists in ordering the different boats called away and in receiving visitors, but as a marine stationed at the gangway sends him word when visitors are approaching from shore he does not have to stand around and wait for their advent.

Every officer on board except the captain must report to the officer of the deck before going on shore and again when he returns to the ship. The formula in the first instance is, "Permission to go on shore, sir?" and in the latter, "Come on board, sir."

The permission to leave is never refused, and is always acknowledged by a salute with the hand, as is the accosting remark when the officer returns.

At sea the watch officers are on duty for four hours at a time. During such watch the officer is responsible only to the captain and is in charge of the ship.

When a man-of-war is in port—be she a flagship—the admiral or commodore usually takes up a residence on shore. The principal reason is that there is nothing for him to do on board. He has no concern with the workings of the ship to which he is attached, and the fleet being at anchor needs no directing. It must be remembered that this applies only to times of peace, however. The captain seldom leaves his ship for all night, though he passes much of the day on shore. The executive officer has to suit his convenience to that of the cap-

tain, for they must not be away from the ship at the same time. As for the other officers, they may go ashore whenever they wish, and remain away night after night should they desire, providing they are on hand when it becomes their turn to serve as officer of the deck, and providing, also, that they report every morning at 9. It is no unusual thing at such pleasant stations as Nagasaki, Honolulu and Nice for certain officers to secure rooms on shore and pass most of the time there. The only hour they must report is for quarters at 9 o'clock every morning.

THE CHESAPEAKE—A SPLENDID SAILING SHIP BUILDING FOR THE UNITED STATES NAVAL CADETS.

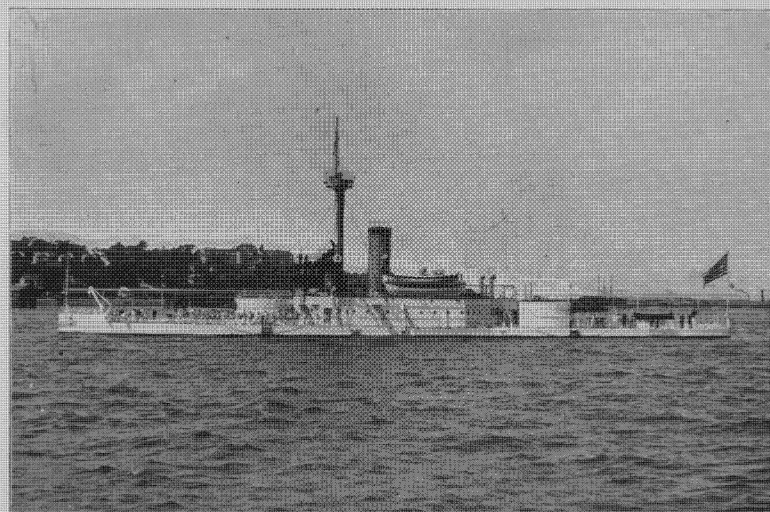
A valuable addition to the new navy will be the large steel practice ship now in process of construction in the yard of the Bath Iron Works, at Bath, Me. This new vessel, for the building of which Congress originally appropriated $125,000 and for whose completion, including armament, $300,000 will be available, will be known as the Chesapeake. She is intended for the exclusive use of the cadets at the Naval Academy at Annapolis, and will be one of the largest and by all odds the finest sailing practice ship in the world. She will be remarkable for her great sail-carrying power, the area of her principal sails being 13,131 square feet and her total area 19,975 square feet. She will also have the distinction of being the only single topsail ship afloat.

The day of sailing warships is past, but Uncle Sam still holds to the theory that the education of a navigator or commanding officer in the navy is not complete unless he thoroughly understands the handling of a sailing ship. And he must be not merely theoretically competent, but practically so. This applies to the ordinary seaman, as well as to the officer, and schoolships for apprentices, propelled by sail power, are an important part of the United States Navy. Some one has

said that it only requires months to make a good soldier, but years to make a good sailor, and every American and English admiral will tell you that the best officers and seamen in the navy are men whose nautical training began on board a sailing ship. Uncle Sam believes this thoroughly, and has seen it proven many times by experience. He now emphasizes this belief by building the Chesapeake. On board of this vessel, and others like her, the Deweys, Sampsons and Schleys of the future will receive the foundation and the most important practical part of their professional education.

The Chesapeake is being built of steel, her bottom sheathed with four-inch pine and coppered. Her stern and stern posts are of manganese bronze. The following are her general dimensions: Length of hull, 224 feet 9 inches; length over all, inclusive of jib and spanker booms, 275 feet; beam, extreme, 37 feet; mean draught, 16 feet 6 inches; depth, 27 feet 7½ inches; displacement, 1174 tons. She has a wood keel 25 inches deep and 16 inches wide, and great deadrise. The vessel is ship rigged, and, as already said, will carry very close to 20,000 feet of sail. Her total heights from the bottom of the keel to the top of the main truck is 158 feet six inches, and the main lower yard is 78 feet long. It is proposed to make the lower masts and yards of steel, the remainder of the spars being of spruce and yellow pine.

Accommodations will be provided on the Chesapeake for the captain, ten ward-room officers, two warrant officers, 180 cadets and a crew of ninety men. In armament the vessel will be up to date, her battery consisting of six 4-inch rapid-fire breech-loading rifles on the gun deck and four 6-pounders and two 1-pounder rapid-fire guns on the spar deck. With boats she will be well supplied, having a 30-foot steam cutter, 30-foot launch, two 28-foot cutters, one 28-foot whaleboat, one 28-foot whaleboat gig and one 20-foot dingy. Steam for the windlass, pumps, distilling apparatus, refrigerating plant, dynamos and for heating purposes will be supplied by two Scotch boilers of ample size. Her water tanks will have a



UNITED STATES MONITOR AMPHITRITE.

capacity of fifty-five tons. There will be no steam propelling machinery, not even auxiliary. With three complete decks, built of the heaviest picked material, the Chesapeake will undoubtedly be a strong, seaworthy and durable vessel, splendidly fitted for the uses to which she will be put.

CHAPTER XIV.

MAXIM'S SUGGESTIONS FOR HARBOR DEFENCE.

THE GREAT INVENTOR HAS SOME ORIGINAL NOTIONS—NOVEL CRAFT DESIGNED BY HIM.

Hiram S. Maxim, the inventor of the deadly automatic rapid-fire gun, has offered his services to the government, and, as an ordnance expert of established ability, he could, no doubt, be of material aid in case of trouble.

Mr. Maxim has some original notions on the subject of harbor defence, and what he has to say should be given the weight his accomplishments warrant. In his own words, he says:

"I have thought a great deal about various systems for defending our great cities in case of war with a first-class foreign nation, and I think I could give my countrymen some hints which would be of value, especially for defending towns situated some distance from the sea, such as New York, Boston, Washington, Philadelphia, San Francisco and the like. I propose to dig several deep trenches in the silt of the river, say eight or ten feet below the present bay or river bed; it would not be necessary that they should be in the deepest part of the channel, but in a place where low water would be about eight feet deep. In each of these trenches I would place a large cast-iron or galvanized-iron pipe, say about twenty inches in diameter. These trenches would lead inland to some point safe from probable bombardment to large reservoirs containing several million barrels of light petroleum, generally called naphtha. After the pipes have been put in position they could be completely covered with broken stones, gravel or earth, which would prevent their being destroyed by torpedoes or shells if they should fall near by in the water. The pipes when

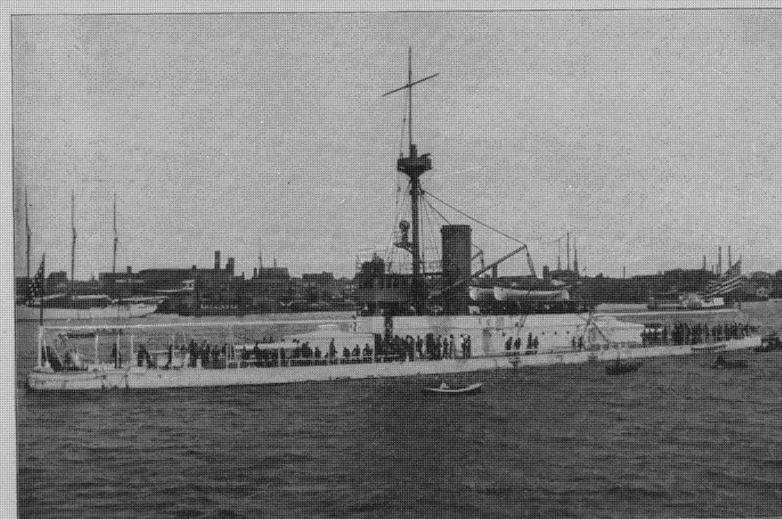
laid would, of course, be full of water, but upon the approach of a hostile fleet, petroleum could be allowed to enter until it had driven the water completely out and have shown itself in a thin film on the surface. Suppose now that the enemy's fleet should attempt to enter the harbor. The channel which will admit of the passage of large ships is not, as a rule, very wide at any part. When the fleet reaches the proper point a cock should be opened and about 1000 barrels of light petroleum allowed to escape and rise to the top of the water. Ships of the foe would then be instantly enveloped in flames. The crew would be either burned to death or suffocated by the heated products of that combustion. If the ships should run through that zone of fire, another field of 100,000 barrels could be liberated, and the whole fleet wrapped in a writhing mass of flames. Not only would this prevent the passage of large vessels, but it would also make countermining operations by the enemy impossible. The necessary dragging for the cables to our mines could not be done on a sea of fire. When the harbor is obstructed by chains or booms, small boats, protected by the fire from larger craft, may in a short while remove such obstructions; but it would be quite impossible for any one to approach the open end of a petroleum pipe. The naphtha could be ignited either by the flash of the enemy's guns accidentally or purposely by some suitable explosive shell fired into the oil field at will. A work of this sort would not cost more than two ironclads, and the advantage would be that it would be quite as effective against 100 ironclads as against one. Moreover, this scheme could be put into operation in half the time that it would take to build a battleship. Assuming that our land forces were sufficient to prevent landing parties, it would certainly be a very difficult matter to put such an apparatus out of action."

Mr. Maxim's plan is not altogether novel, two Americans having presented a system upon somewhat similar lines to the Chinese during their recent war with Japan. By some official rascality the explosive chemicals were destroyed or purposely spoiled, and the practical virtues, if one may use the term, of this method of wholesale annihilation were left for the future

to prove. A revival of the "auto da fe" might not be out of place, especially when considered in connection with all that it has meant in Spanish history.

Mr. Maxim deems the battleship but a compromise upon the strictly defensive craft. He says: "She must be built so that she can keep the sea in all kinds of weather, and she must be able to carry large quantities of coal and to accommodate a numerous crew. Many things have to be sacrificed in order to meet other requirements which are still more important; but if a vessel were built expressly for defensive purposes in comparatively smooth water, its fighting power, in proportion to its cost, could be made greatly superior to that of the best man-of-war of today. I think the best vessels for us to build for defensive purposes would be of about 2000 or 3000 tons burden. It should be possible to sink them so low in the water that only an armored turtle-back would appear above the surface when going into action. At other times, i. e., when cruising from port to port, they could ride much higher out of the water. They should be provided with very powerful engines operating twin screws, and, if possible, should use petroleum for fuel. They should be formed, as I have sketched, so that they will present but a moderate target to the enemy, with all vital parts protected by the deflective surface of the armored turtle-back. Their principal armament should consist of a single and powerful automatic gun, mounted forward, and arranged in such a manner that, upon firing, the gun should completely disappear and the port through which it fired be automatically closed." In the sketch a sliding shield covers the gun-port, and, in recoiling, the gun falls back and down into a trough or groove in the heavy armor of the curved deck and beyond the reach of shot.

Mr. Maxim says he has designed a system by which the heaviest gun can be fired from four to six times a minute; and the destructive force of one such gun as compared with out own slow-firing great guns now in use is easily imagined. He argues that four of the defensive boats such as he suggests could be built for the price of a single battleship, and in half



Speed, 12 Knots. TERROR (Monitor). Cost, $3,178,000.

the time; and one of them in a harbor would be more than a match for the best battleship afloat.

"A battleship of necessity presents an immense target above the water, and in order to bring all her guns into action she must present her broadside, but a vessel such as suggested would go into action head on, and would keep head on during the action. By firing a great number of shots in a short time she would be able to inflict heavy damage with very little chance of injury in return."

As a menace to the unarmored portions of a foe and as a safeguard against torpedo-boat attack, Mr. Maxim would supplement the main battery of one great gun with a secondary force of a dozen 12-pounders of an automatic, quick-firing type of his own.

As the vessels are not intended for distant work, but always to be within easy touch of a base of supply, the weight otherwise given to large quantities of coal could, in the case of these ships, be given largely to the engines. In the semi-submerged or fighting condition Mr. Maxim counts upon a speed of eighteen knots, and, as the vessels are also intended to ram, the blow from a moving body of quite 3000 tons traveling at that rate would prove destructive to the stoutest craft afloat today. With the water ballast out and in light crusing trim, he expects a speed of something in the neighborhood of twenty-five knots an hour.

As can be seen, Mr. Maxim's idea embodies a development of our ram, the Katahdin, the monitor and the whaleback; and there is every reason why his type should be carefully considered in the evolution of the coast defence vessels carried by the present naval appropriation bill.

His petroleum defence, however, is too much on the order of "hot stuff" to meet with the approbation of those men accustomed to mete out an enemy's welcome in so much cold steel and lead.

CHAPTER XV.

WAIT FOR THE DOWNWARD ROLL.

DIRECTIONS FOR FIRING AT SEA EXPLAINED BY A NAVAL OFFICER.

Other things being equal, the coming contest, like all other naval contests, will be won by marksmanship, and good marksmanship has been a distinctly Yankee quality ever since the Revolution, both on land and sea.

It was the salvation of the American cause in the war of 1812, and it showed itself again in the Mexican War, though then there was no sea fighting. There was as good shooting in the Civil War, too, as ever, but the marksman on both sides were Americans, and its effects on either side were offset by good work on the other. In my judgment the trained gunners now in our navy will shoot as well as their fathers and grandfathers did before them.

The American practice both in the army and navy has always been to shoot low, and always to save ammunition until it was possible to use it effectively. In the navy the tradition to shoot low has crystallized into a standing rule, unwritten indeed, but none the less religiously observed, and its wisdom has been proved on more than one occasion of great importance.

The precise form of this unwritten naval rule is to "wait for the downward roll." This is the converse of the maxim obtaining in the British navy that it is best to take advantage of the "upward roll," which has been observed almost from the beginning of naval fighting by the gunners of English ships, and to which much of the power of England's "wooden walls" to defend the island was attributed in the days when England, and not the United States, was at war with Spain.

BEST TIME TO FIRE.

Necessarily the deck of a vessel at sea offers a much less satisfactory platform from which to shoot than the solid foundation provided in a land fort, since even when the ocean is calmest, the vessel must constantly roll from side to side. Theoretically, the best time to fire would be at the moment between rolls, when the deck of the ship is perfectly level, and in a general way it may be said that an attempt is made to do the shooting at that instant. It is practically impossible, however, to fire invariably when the decks are horizontal. No matter how careful the gunner, the piece is almost always exploded just before or just after the proper instant.

It was noted by the sea fighters in the Revolution that projectiles from guns fired when the ship was heeling from the enemy in the upward roll was hurled higher in the air than was intended, and that well-aimed shots were thus often sent harmlessly overhead or, at best, took effect only in the rigging instead of the hull of the enemy, where they would do most damage. On the other hand, it was observed that shots fired when the vessel was heeling toward the enemy on the downward roll, though frequently striking lower than was intended by the marksman, almost invariably took effect.

AMERICAN SUCCESS.

This was rendered the more certain from the fact that the spherical projectiles then in use would ricochet along the surface of the waves if they struck the water, exactly as a stone will skip along the top of a pond when properly thrown from the hand of a small boy. The advantage taken of this fact by the Americans in the war of 1812, who "invariably waited for the downward roll," increased the effectiveness of their gunnery immensely, while, by the same token, the British rule to fire as the vessel heels from its opponent, or on the upward roll, rendered a large proportion of British shots quite harmless. The British notion has always been that firing on the upward roll, when the heeled-over side of the vessel afforded

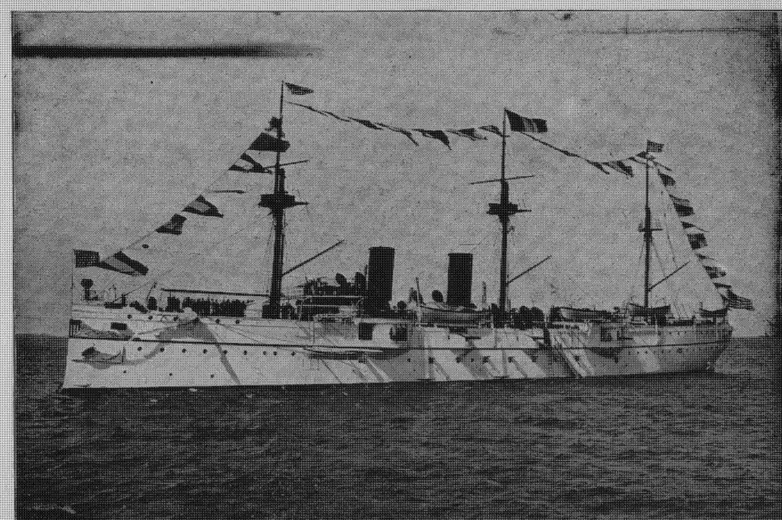
the broadest mark, had a tendency to protect the ship, because the smoke of the discharge would hide it somewhat from the enemy's sight, but Yankees have never taken much stock in that contention.

VALUE OF DOWNWARD ROLL.

The great value of a downward roll rule was first demonstrated in the fight between the American frigate Constitution and the British frigate Guerriere on August 19, 1812. Although the American ship had a slight advantage in size and number of guns and men, yet after the vessels drew near enough to prevent their projectiles falling short, nine-tenths of all the shots from the American guns took deadly effect, while not more than half of those from the British pieces did any damage.

The number of killed in this engagement was not large on either side, but the fight was one of the most hotly contested in all naval history. It lasted only forty minutes, and at its close the British commander, Dacres, was obliged to surrender unconditionally to his American opponent, Captain Isaac Hull, for the simple reason that the guns on the British ships were practically all disabled, since much of the rigging had been shot away close to the deck.

Modern cylindrical projectiles do not ricochet along the water as uniformly as did the old-time spherical cannon balls. The modern projectile proceeds with a whirling motion, and this sometimes causes it, when striking the water, to swerve to the right or left, sometimes to jump straight up in the air, and sometimes even to dive straight down to the bottom of the sea. Yet, it is the opinion of two or three naval and gunnery experts with whom the writer has discussed this question that the rule to "wait for the downward roll" will be maintained in the war with Spain.



Speed, 19½ Knots. SAN FRANCISCO (Protected Cruiser). Cost, $1,428,000.

CHAPTER XVI.

UNIQUE TYPES OF AMERICAN WARSHIPS.

THE MONITOR, THE RAM AND THE DYNAMITE CRUISER ARE FOUND ONLY IN OUR NAVY—THREE DANGEROUS CRANKS—MONITOR AND RAM HAVE PROVED THEIR VALUE, BUT OTHER NATIONS FIGHT SHY OF THEM—WHAT EACH CAN ACCOMPLISH—THE VESUVIUS A DOUBTFUL WAR FACTOR AND IS THE ONLY TYPE OF HER CLASS.

Fleets of ships are in some respects like communities of people—there are in them good ships, just as there are in communities good people, and there are worthless ones, just as there are blackguards. Some ships are always in luck, always getting soft snaps; others are continually in hot water and in disgrace. Some are dignified, sensible, as it were; others are slack and undisciplined. Finally, as in every community, there are some odd, peculiar chaps—good fellows, though—so in every large fleet there are a few cranks, or freaks—ships different from other ships, yet not the less valuable as a means of fighting on that account.

Chief among these crank ships in our navy is the monitor, the prototype of the present battleship. Nearly forty years ago Ericsson offered the plans of the first monitor to the United States Government. The result promised, in case his design was adopted, was an ironclad vessel of small dimensions capable of navigating the Southern rivers and absolutely impregnable against the ordnance possessed by the Southern States. The draught of water was limited to eleven feet. Ericsson further undertook, for $275,000, to construct her in the space of 100 days. He kept his word. The main features of these early monitors which made them unique were the same main features which distinguish the four new monitors--Ter-

ror, Miantonomoh, Puritan and Amphitrite—from the other ships now in the Atlantic squadron. These peculiar characteristics of the type may be thus described:

A nearly flat-bottomed vessel armored on the sides and on the deck, which is almost level with the water. Above this deck rise one or two revolving turrets. Inside them are large caliber guns. The monitors were a success from every point of view. All the world admired them when they first were put afloat. An English authority thirty years ago pronounced the "monitor vessel" as the most perfect conception to his mind of what a country ought to have for the attack and defence of ports and arsenals. The thirteen ancient ballahoos now in our navy, eight of which have been hauled out of the mud near League Island Navy Yard, Philadelphia, are the same monitor vessels that drew forth such eulogiums from an English government official.

THE OLD TIMERS.

The Ajax, the Canonicus, the Mahopac, the Manhattan and the Wyandotte of 2100 tons displacement each, and the Comanche, the Catskill, the Jason, the Lehigh, the Montauk, the Nahant, the Nantucket and the Passaic, of 1875 tons each, are the names of these old hookers. The only one of the original lot missing is the Saugus. They were all of them built during the war, they fought in it most of them, and were repaired and improved after it. These thirteen ships of which we are telling are the original Ericsson type of monitor, built of iron, with single bottoms, without rams, propelled by a single screw, and at present armed with two 15-inch smooth-bore cast-iron guns in a single revolving turret, which rotates around a central shaft on which is mounted the pilot-house. The protecting armor of the sides is five inches thick; that of the turret eleven inches. The engines are of the simple vibrating lever type, and the speed is five or six knots. Such vessels are cranks; they are oddities; they have outlived their time; but like many persons similarly situated they have their uses, and with a little toning up they will no doubt be able once

again to put up a fight and exhibit some of their old-time ability to give and take hard knocks.

What better proof of the high esteem in which these ships of the ancient regime are held is wanted than the knowledge that two of these same old obsolete war-time monitors—the Nahant and the Jason—are to be stationed in New York harbor, two at Boston and four at Philadelphia? The Nahant has been in service as a training ship for the North Carolina naval militia. Others which have been devoted to the same purpose are the Ajax at Camden, N. J., the Wyandotte at New Haven, the Passaic in Georgia and the Comanche in California.

Of course, these "cheese boxes," as they were facetiously dubbed "a many years ago," will need some patching, a new boiler here and there and lining up of some of the machinery, then they will be all right, ready to respond to the best of their ability to any call their country may make on them.

THE MODERN MONITOR.

Despite the fine record of the monitor as a fighter, foreign navies have not copied the type. We alone stick by her. Indeed there are many officers in our navy today who hold the opinion that she is the best of all types not only for coast-defence purposes, but also to engage a battleship in the open. These extreme views, however, are held concerning the newer ships of the type, the big 6000-ton Puritan, with four 12-inch rifles in her two turrets; the Monterey of 4100 tons and four modern guns, and the Terror, Amphitrite and Miantonomoh, of 4000 tons, carrying four 10-inch rifles. These modern monitors have modern engines, twin screws, good armor and a speed just double that of their congeners. People may sneer at these crank ships, but give them a chance and they will again show the stuff that is in them.

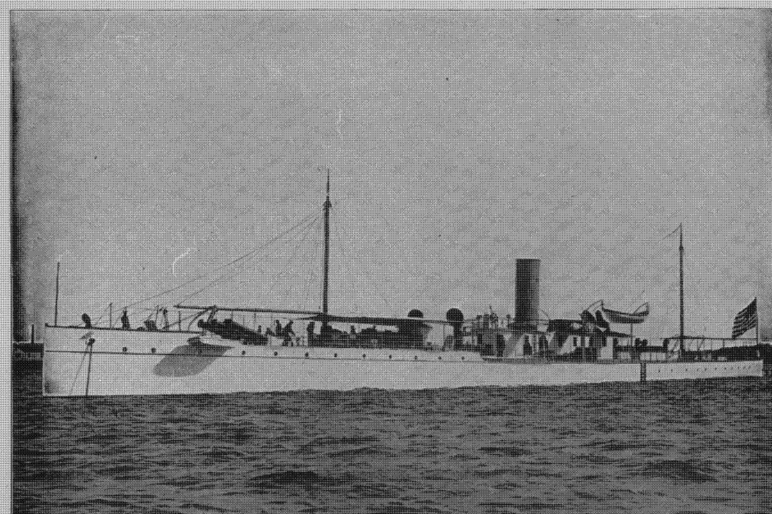
Another unique craft in our Atlantic fleet is the ram Katahdin. The only other vessel in the world at all resembling her is the English torpedo ram Polyphemus, a larger ship and fitted to fire torpedoes from under water tubes. Our ship has

no other armament than four small rapid-fire guns to be used against boat attack.

THE RAM KATAHDIN.

The Katahdin has a displacement of 2155 tons and a speed of nearly seventeen knots. She could strike another ship with a force of about 26,000 tons per square foot. A 13-inch gun firing a projectile of 1000 pounds weight, with a velocity of 2000 feet a second, would strike an armor plate with about the same force. But the injury inflicted by the ram below the water line would be incalculably more serious than could be inflicted by the shot; the hole made would be much larger, and the inrush of water would undoubtedly send the stricken ship to the bottom.

The first use of the ram as a weapon pure and simple in our time was in 1862, when the rebel ram Merrimac, going at the rate of four knots, struck the Cumberland, a wooden Union ship lying at anchor. Two blows were struck, one direct, one at an angle, and the brave Cumberland, her colors flying, with all her crew on board, went down. Perhaps the tactical value of the ram per se was better illustrated at the battle of Lissa in 1866. There were in this engagement seven modern Austrian ironclads pitted against nine Italian armored vessels of later design, greater speed and heavier armor. The Austrian admiral made the signal, "Courir sus a l'ennemi pour le couler." In obedience thereto the Ferdinand Mox, going ahead at a speed of eleven knots, struck fair and square the side of the Italian ship Re d'Italia, causing her to keel over under the influence of the blow until her spar deck was awash; then, as she righted, the Mox backed slowly away. "In two or three minutes the victim plunged heavily down, leaving nothing to tell of her whereabouts except a few shrieking, struggling remnants of her ill-fated crew of 600 men." The Ferdinand Mox was uninjured.



Speed, 21½ Knots. VESUVIUS (Dynamite Cruiser). Cost, $350,000.

THE RAM IN ACTION.

If further confirmation of the power of the ram be needed it can be found in the awful catastrophes which have occasionally resulted from accidental collision. When the Iron Duke struck the Vanguard she tore a hole fifteen feet square in the Vanguard's side, sending her to the bottom within an hour. Equally fatal was the ramming of the Grosser Kurfurst by the Konig Wilhelm, when the former sank immediately with nearly all her crew. More recent still, and perhaps more terrible, was the loss of the Victoria when the Camperdown rammed her. These examples of warfare and accident prove sufficiently the destructiveness of the ram, and there are able tacticians who hold that as a means of offence it ranks first. Undoubtedly, if the gun and the torpedo fail in settling an action on the high seas between two ships the ram will surely end the contest, but whether a ship built exclusively to launch herself against an enemy, trusting entirely to her own momentum to inflict a death blow, is sure of success is altogether problematical. Indeed, so many chances are against such a vessel reaching her mark that no other nation besides the United States has dared to take the risk. Verily such a craft sets her life upon a single cast and must stand the hazard of the die.

The third freak among our collection of ships of the Atlantic squadron is the dynamite cruiser Vesuvius. Fancy what you would feel if, in the village where you lived, you were told there was a dynamite crank knocking about loose. You would think, very properly, that such a crank was dangerous, was addicted to blowing up people and things with dynamite, the most terrible in its action of all explosives, and you would do your best to avoid him. Not unlike the man is the boat.

THE VESUVIUS.

The Vesuvius is a narrow, low vessel, 264 feet long and 810 tons displacement. At the time of her trial, six or eight years ago, she made a speed of 21.6 knots, then the fastest in the

world. Her armament is her most strikingly peculiar feature. It consists of three pneumatic dynamite guns placed side by side, inclined at an angle of about twenty degrees, in the bow of the ship. Eight or ten feet of the muzzles of these forty feet long guns or tubes show above the deck. Each one of them can throw a shell charged with 200 pounds of high explosives a distance of a mile—air is the propellant, not powder. Most naval officers in our service as well as elsewhere have always distrusted this craft, and not without some reason. One objection to the Vesuvius is that her guns are built into the ship, so they can only be trained by moving the vessel, an exceedingly difficult thing to do with any approach to accurate pointing. Another is that the guns are effective only within the distance of a mile, and to get within this range the Vesuvius, an unprotected vessel, lightly constructed, would be at the mercy of every rapid-fire gun that could be brought to bear. Still another objection is to the uncertainty of the effectiveness of the aerial torpedo she discharges; in one set of trials of the guns not a single fuse exploded upon contact. On the other hand, it is urged with much force by the admirers of the ship that a skilful commander can lay the vessel so that her guns will be pointed as accurately as any other large guns, and certainly in practice some remarkably good shots have been made; also that she is as much protected as any other craft of her size and kind, being, in fact, nothing more nor less than an enlarged torpedo-boat. Further, it is held that if only one of her shots should explode anywhere near her enemy, destruction would surely follow.

THE DYNAMITE CRUISER'S USEFULNESS.

It is difficult in the face of the evidence to decide on the merits of such a crank as the Vesuvius. Although she has been in the navy several years she has never been duplicated, notwithstanding the fact that there was an appropriation of money made to build a second one. Nor has any other navy constructed a craft at all like her. Our government, how-

ever, has not lost all faith in the Vesuvius. She is now being put into perfect condition, preparatory to going into action.

Our three crank types—the monitor, the ram, the Vesuvius—are coast defenders; perhaps we should say harbor defenders. They belong to the inner or second line of defence, where the torpedo-boats belong. Just how stout a fight any one of them could put up, or what the chances of success might be in an action under modern conditions of warfare, it is difficult to conjecture, not one of them ever having been put to the test. There can be no doubt, however, that they will exercise a great moral force. No sane commanding officer would dare boldly approach a point defended by any one of these three cranks. Not so much would he hesitate because of fear of an engagement—he would like that were it to be ship against ship—but because he would not know what to expect from such an uncanny antagonist. The mere cry, "Torpedoes ahead," made Admiral Farragut's entire fleet tremble with fear. There are very few men who have in them the heart to damn the weapon and go ahead. Most men, afraid of nothing else, fight shy of cranks. They do so on shore, and perhaps they would do so at sea.

CHAPTER XVII.

EARTHEN TRENCHES.

THEY WILL CUT CONSIDERABLE FIGURE IN FUTURE BATTLES—HOW THEY HAVE BEEN EMPLOYED IN ALL AGES—QUICK WORK FOR AN ARMY IN PUTTING UP DEFENCES IN THE OPEN.

Wars have been waged by the nations of the earth from the earliest times, and it is safe to say that, so long as the nature of man remains what it is, wars will continue to occur, more or less frequently, until the end of time.

Never in the history of the world have nations in general been so fully armed, equipped and trained for the destruction of each other, or their own protection. As death-dealing weapons have from century to century been perfected and new ones invented, attempts have been made to keep pace with this by some form of bodily protection for the soldier.

In ancient and mediaeval times, when the sword, spear and arrow were the weapons, considerable protection was afforded by body armor. Among the less civilized nations this was strong, fibrous matting or tough hides, while the more advanced nations wore coats of mail or plate armor. In addition to this armor, the warrior carried a shield of similar material, with which to ward off blows or intercept missiles.

But with the invention of gunpowder and the use of firearms, all former means of protection were found inadequate. Recent inventors claim to have perfected an armor cloth that is proof against the bullet from our high-power rifles, but military writers agree that this, in its present form, is unsuitable for the conditions of field service, and other means of protection must be sought.

In the days of flintlocks and smooth-bore muskets, the com-

HARBOR—KEY WEST, FLORIDA.

paratively short range and low penetration of their bullets enabled men on the field of battle to gain considerable protection from improvised breastworks of fence rails, logs, etc.

The greater penetration of bullets from the modern rifle, being about forty-four inches in pine and twenty-one inches in oak, virtually prohibits the use of timber, unless combined with other materials.

The only material that a soldier is always likely to find at hand is earth. By successive stages man has been compelled to depend almost entirely upon mother earth for effective protection on the battle field.

The use of earthen entrenchments is not limited to modern times, for this means of defence in battle is as old as the history of warfare.

On our own continent vestiges of circular and other forms of earthen defences have been discovered, the antiquity of which can only be conjectured. In Ireland the ancient inhabitants have left remains of many earthworks, while in England numerous earthen fortifications of the early Britons and Romans can still be traced. The Romans relied much upon their entrenchments, and executed them with marvelous rapidity. It has been said of them: "By moving earth they conquered the world."

When in an enemy's country they frequently entrenched after each day's march, and at such times the Roman soldiers carried, in addition to weapons and armor, a strong stake. These stakes were used to form a stockade, which, in connection with their ditches and parapets, gave shelter behind which they could resist greatly superior numbers.

Charles V, of Germany, during his wars in the sixteenth century, prominently recognized the merits of field works, and to each regiment of infantry he attached large numbers of pioneers, provided with intrenching tools, under command of a special officer. He fully appreciated the use of this kind of a force, which on many ocasions was of inestimable value to him.

Napoleon said: "In a war of march and manoeuvre, if you

would withstand a battle with a superior army, it is necessary to entrench every night and occupy good defensive positions."

General Sherman said: "Field works will hereafter play an important part in wars, because they enable a minor force to hold a superior one in check for a time, and time is a most valuable element in all wars."

Major-General Wright, who commanded the sixth corps of the Army of the Potomac in the attack upon Petersburg, said of this attack: "It cost us in killed and wounded a number equal, perhaps, to that of the entire force of the enemy actually engaged. It was an attack of nearly two divisions against a picket line covered by a simple trench and parapet; but had it been held by two ranks of good troops it is doubtful if it could have been carried by an entire army corps. The conclusion I draw is that a simple trench defended by two ranks of infantry, covered by abattis or other obstacle, and placed on ground which allows the range of their arms to develop itself, is absolutely impregnable, except by surprise."

This was before the days of magazine rifles, and the power of small arms against an assault has since been greatly increased.

Before the late war we had many examples of what had been done in this country and abroad by the use of field works.

At Bunker Hill some 2000 raw militia men repulsed two assaults of 4000 British regulars, and retired only from the want of ammunition.

At Savannah in 1779, 3000 British, behind entrenchments, repulsed 8000 French and Americans with a loss of 878, the British loss being trifling. At Warsaw, Kosciusko, with 10,000 Poles, entrenched, drove back 60,000 Russians and Prussians.

At New Orleans, in 1815, 4000 Americans, mostly raw volunteers, sustained the attack, behind entrenchments, of 8000 British veterans, whose loss was about 2000 killed and wounded, while the Americans' loss was only thirteen.

In 1861 the condition of warfare had changed somewhat. The introduction of rifled cannon and small arms nearly doubled the effective range of the former and trebled that of the latter, thus the fire-swept zone separating the opposing

forces at the beginning of a battle and the intensity of the fire were greatly increased. Under these new conditions it fell to the lot of Americans to demonstrate to the military world the still greater value of hasty entrenchments.

Our war was characterized by several new departures, such as the use of ironclad vessels, extensive use of cavalry for raiding and for screening other troops, and last, but not least, the development of hasty entrenching of the battle field. In the early years of the war the officers and men on both sides failed to appreciate or use the pick and shovel until costly experience taught them that the new conditions due to improved arms, gave to those on the defensive such an advantage that even attacking forces must frequently entrench sometimes under fire. This was frequently done, afterwards, to hold ground gained or to resist counter attacks, while the enemy's flank was being turned.

So well did the veteran troops learn the value of their trenches that upon halting after a day's march, near the enemy, they immediately set to work to entrench. No orders were necessary; in fact, it was often difficult to have them delay long enough to have a proper line marked out. If no tools were at hand, bayonets, tin cups and jack-knives were used—the trenches must be made. But it was not until 1864 that the lesson of entrenching was so thoroughly learned; then Grant against Lee in Virginia, and Sherman against Johnston, in Georgia, found it most expedient, necessary and successful to meet entrenchments with entrenchments on almost every battle field. Our example was followed and the wisdom of our methods demonstrated by General Skobeloff and others in the Russo-Turkish war of 1877-78. Capt. F. V. Greene, then our military attache with the Russian army, wrote of the march of Skobeloff's division from Plevna to Constantinople: "Every man carried an implement of some kind, about 85 per cent. being spades or shovels, 10 per cent. picks and the rest axes, etc. His division marched with these on their backs from Plevna to Constantinople; they were slung over the back, the handle projecting above the left shoulder, and the spade below the right hip, and were attached to the right shoulder with a

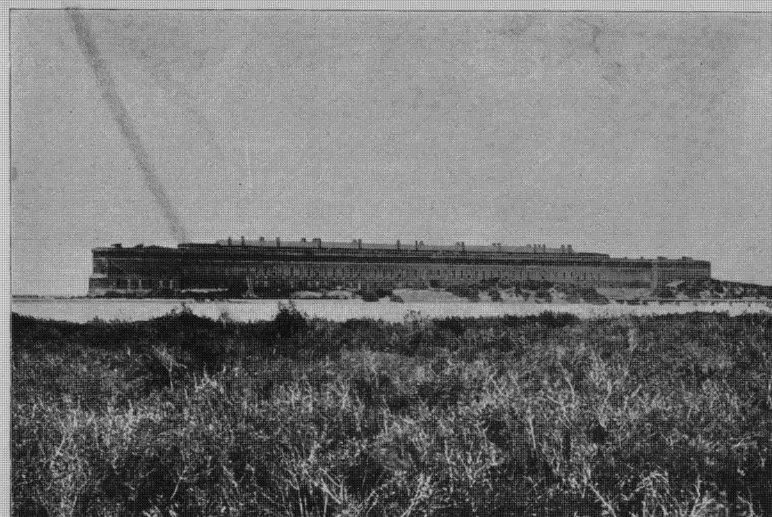
piece of string, a strap, a piece of old tent or anything else that was available; they were heavy (weighing over five pounds); they were uncomfortable; they were in every way inconvenient; but, each man had learned that his individual life depended upon his musket and spade—and he took good care to lose neither the one nor the other."

The simplest form of shelter for a soldier in open country is a shallow trench, which will furnish from the excavation sufficient earth, when heaped upon the side toward the enemy, to screen the soldier from view and to protect him from bullets. This is commonly known as a rifle pit or shelter trench. The smallest trench that can be made upon level ground and afford shelter to a man is sloped from the surface of the ground in front to a depth of eighteen inches in rear, and its width is five feet.

Its length depends upon the number of men to use it. The earth taken from the trench and heaped upon the ground in front will make a mound fifteen inches high and three and one-half feet thick, allowing protection against small arms' fire. A log laid in front of the trench and the earth thrown over and against it adds greatly to the protection. A trench of this kind can be made by troops with intrenching tools in about thirty minutes. In an hour's time this trench could be made eighteen inches deep throughout, allowing men to kneel in firing and still be protected.

In about two hours, if the soil is not difficult to dig, the trench can be made eight feet wide, giving a mound of earth three feet high and enabling men to stand erect in the trench while firing. The first trench offers no obstruction to an advance of cavalry or artillery over the ground, but the two latter would, should the enemy get so far.

In rocky or marshy ground, where a deep trench would either require much labor or be impracticable, the necessary earth for the breastwork may be obtained by digging a shallow trench on each side. In a timbered country, if time be allowed, trees could be cut and a log revetment made, about four feet high, and the earth thrown up against it from the outside.



FORT TAYLOR, KEY WEST.

The ground in front could be covered by a row of strong boughs, laid close together, the butts stacked to the ground. A slight glacis would protect this obstacle from artillery fire, and it would be of service in checking the advance of assaulting parties and holding them under close fire for a time. During the war head cover was obtained by what was known as a "head log" placed a few inches above the top of a parapet to allow of firing under. It was supported on long skids, so that if struck by a cannon ball it would slide down over the heads of the men, instead of falling on them.

Trenches to be strongly defended should have two men for about every three feet in length—one man in the firing line and one in reserve to provide for casualties and act as a support.

For different soils, the thickness which will resist the penetration of modern rifle bullets is—for sand sixteen inches, loam twenty-four inches and clay forty-two inches. As a factor of safety an additional one-third should be added to these figures in the construction of intrenchments.

The armies of almost all civilized nations have today an intrenching tool, in some form, as part of the equipment of the soldiers.

Though we were the first to demonstrate the general utility of such implements in modern warfare, we are today behind in the matter of such equipments.

As we do not know how soon we may be called upon to enter the field in active war, it would be well for us to prepare in this respect, as we have in others. Our National Guard should have some such equipment and some instruction in the principles of hasty entrenchment.

To the uninitiated, the use of such defences on the battle field may seem unheroic, but the most tried veterans of late wars have tested their value and necessity, placed the stamp of approval upon them, and have shown, afterwards, by many desperate assaults, that their power to take the offensive was not thereby diminished.

It has been truly said: "In military matters, as in others, there is a time for every purpose—a time to attack and a time to refrain from attacking, a time to entrench and a time to refrain from entrenching. The question of questions is, where and how to do these things?"

But the concensus of opinion is that the pick and shovel will be important factors in great wars of the future, as they were in the days of '64 and '65.

CHAPTER XVIII.

THE MOSQUITO FLEET.

TO KEEP A STRICT WATCH FOR THE ENEMY ALONG THE ATLANTIC—MARYLAND NAVAL RESERVES WILL MAN THE CRUISER DIXIE, MONITOR MAHOPAC AND OTHER VESSELS IN THE FIFTH PATROL DISTRICT, WHICH INCLUDES THE CHESAPEAKE—DESIGNED FOR SCOUT DUTY, THE "MOSQUITOES" MAY STING HOSTILE SHIPS.

Baltimore, the Chesapeake bay and the Atlantic coast, from Metomkin Inlet on the north to New Inlet on the south, is in the fifth district to be protected by the newly-organized mosquito fleet of coast-defence vessels. The former inlet is off the coast of Accomac county, Virginia, and the latter off the North Carolina coast a short distance to the northward of Cape Hatteras.

WORK OF THE MOSQUITO FLEET.

The mosquito fleet, which is to be divided into smaller fleets or squadrons, each to defend a certain district, will extend all the way from the Canada line on the north to the Florida Keys and around the Gulf coast to the Mexican line on the south. It will consist of about 150 vessels, varying from large ocean steamers to small yachts and tugs just large enough to mount a single gun. It is intended to protect commerce as far as possible and to guard the coast. It will be manned by members of the Naval Reserves and will patrol night and day on the lookout for Spaniards.

THREE PATROL LINES.

The defenders may be divided into three lines: The first

twenty-five miles out, which would, of course, be composed of the largest craft; the next midway to the shore, composed of the middle-class vessels, and the last close to the shore, composed of the smaller tugs and yachts. A thorough system of signals will be arranged, so that the approach of the enemy can be readily and quickly heralded.

TO PREVENT BLOCKADE.

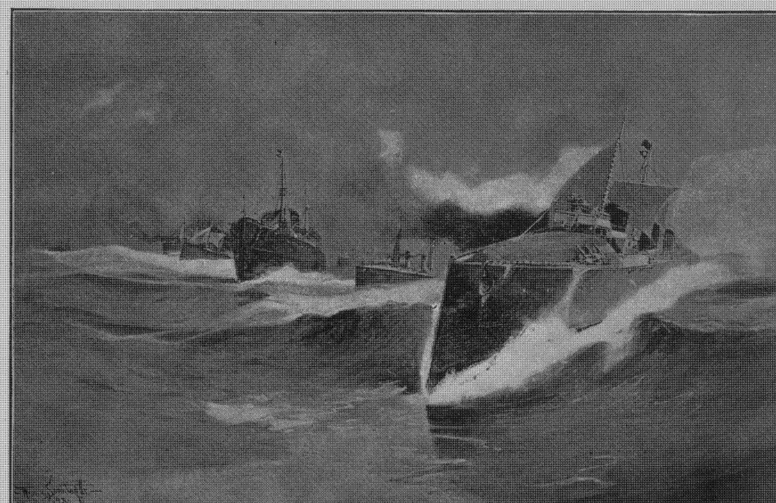
It is very important to provide against the possibility of blockade. This can be done only by adequate naval defence, in addition to fortifications. And as a means to this defence and to prevent the possibility of any such catastrophe, the mosquito fleet will devote its energies to the waters near our harbor. Its sphere of action will be limited to keeping in touch with the enemy's squadron should it dare to approach our coast, and to send information of its movements to the signal station on the shore. It might be under certain circumstances advisable and even necessary for these mosquitos to get within range of the enemy and begin with their long-carrying, though small-calibered, guns to sting him, much as would their namesakes.

MIGHT BEAT OFF A FLEET.

It is quite possible for several of these fast small boats to beat off a small cruiser fleet that came within range of their guns. Then, too, some of the larger vessels of the mosquito fleet will be armed with a few rapid-fire guns of caliber sufficient to send a shot through four or five inches of iron at 1000 yards' range.

SEACOAST RESIDENTS SAFE.

Our cottagers and summer seacoast visitors should bear in mind the fact that not only will they have the mosquito fleet to protect their lives and property, not only will there be some few big vessels like the monitors to help the small craft



SPAIN'S TORPEDO-BOAT FLOTILLA.

do the fighting, and not only will the guns mounted on the coast forts carry further than the guns of the Spanish vessels, but also that there would be no object to be gained by the enemy in destroying a cottage by the sea, no indemnity can be obtained to amount to anything from such communities, no coal, no provisions, no assistance of any sort. Indeed, the happy families can, we assure them, rest as quietly and safely and enjoy the bathing as thoroughly, so far as the Spanish fleet is concerned, as though there were no war. Ships like the Spanish that have to come 3000 miles to fight cannot afford to waste ammunition and coal and time in engaging in battle with defenceless houses.

IN THE FIFTH DISTRICT.

The squadron of the fleet, which will protect the fifth district, will be manned principally by the Maryland Naval Reserves, under Commander Emerson, and will consist of the auxiliary cruiser Dixie, the monitor Mahopac, a number of seagoing tugs, the steam yacht Nydia and others. The larger vessels which will be assigned to the mosquito fleet later on, as the enemy approaches these waters, will be well armed with effective guns of the large rapid-fire type. On the smaller vessels, such as the yachts, tugs and revenue cutters, will be mounted machine guns and six-pounders. They are not expected to do any offensive fighting except as a last resort, but are expected to patrol the coast and notify the shore signal stations whenever a hostile fleet is sighted. It is expected that Spain will issue letters of marque to a large number of privateers, and it is to guard the coast against these vessels that the mosquito fleet is to be of the greatest service.

WHEN AN ENEMY IS SIGHTED.

When a privateer or a war vessel is sighted the little vessel will run into the nearest signal station and the news will be at once communicated to headquarters, to be established at various points. This will enable the land batteries to prepare for

the intruder and keep the warships informed as to the whereabouts of the hostile vessels. The mosquito fleet is mainly composed of vessels of considerable speed and of light draught, and can easily run into the shallow creeks and bays to escape the enemy. With their machine guns they can repel boarders and their six-pounders may be serviceable against privateers of a low grade.

About sixty signal service stations will be established along the coast, principally in the vicinity of the lighthouses.

CHAPTER XIX.

SHARES IN PRIZE MONEY.

HOW CAPTURED VESSELS ARE CONDEMNED IN FEDERAL COURTS AND THE PROCEEDS DIVIDED.

The methods of procedure in the United States with regard to a vessel captured by a warship are prescribed in the prize act passed on June 30, 1864, and since incorporated, with amendments, into the federal statutes.

The captor is required by this law to send the captured vessel to a near port, preferably a United States port, but allowably a neutral port. If to a United States port, the vessel is taken in charge by the Federal District Court, and there are judicial proceedings in admiralty, the idea being to determine judicially whether the capture was lawful. If it is so decided the vessel and cargo are condemned and ordered to be sold and the money turned into the United States treasury as prize money.

The proceeds of the sale are entirely given to the captor if the vessel is of superior size or force, while only one-half is given if the capture was of inferior force, the United States getting the other half.

The sum which goes to the warship is distributed according to the following rules: Commanding officer of a fleet, one-twentieth; commanding officer of the division of the fleet to which the captor belonged, one-fiftieth; fleet captain, one-hundredth; commander of the vessel, one-tenth, while the junior officers and men divide the residue in proportion to their respective rates of pay.

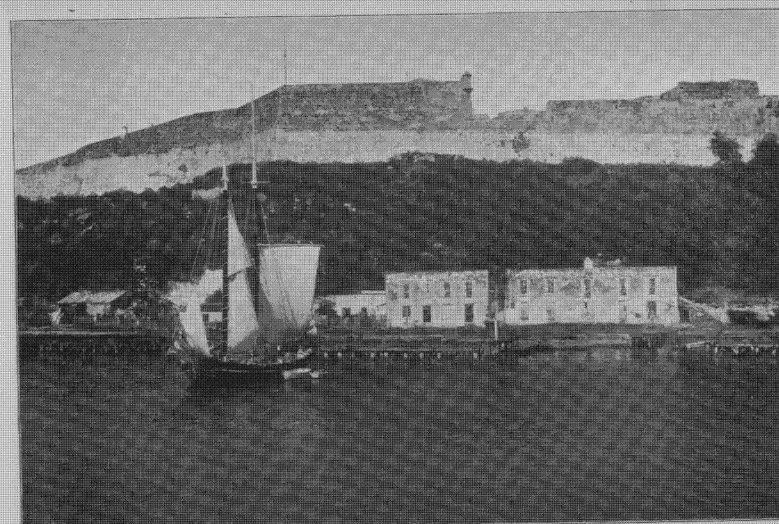
CHAPTER XX.

DYNAMITE IN MODERN WARFARE.

USES AND DANGERS OF DYNAMITE BOTH AFLOAT AND ASHORE.

In the warfare of today, whether it be on land or sea, dynamite is bound to be an important factor. The limited knowledge of its possibilities and the frightful danger attendant upon its use are elements which add a sort of horrible fascination to everything which may be said or written concerning it.

While there are dynamite guns defending every seaport of the United States, the pneumatic battery at Sandy Hook, N. J., guarding the entrance to the harbor of New York, is the most complete means of defence in the world. The result of the experiments with the guns of the Vesuvius and the various trials of these weapons both at Sandy Hook and Fort Lafayette have all been highly satisfactory. The tests at first included range, accuracy, rapidity of loading and firing and proper action of the valve mechanisms. It was also demanded that the eight-inch gun must be able to cover all ranges from 100 to 2600 yards with shells containing 100 pounds of explosive gelatine and from 100 to 3200 yards with shells containing fifty pounds. The 15-inch gun, with fifty pounds, must range from 100 to 5500 yards; with 100 pounds, to 4500 yards; with 250 pounds, to 3550 yards, and with 500 pounds, to 3000 yards. The desired result was more than attained in every instance. It is known that a shell containing 200 pounds of dynamite will blow the largest ironclad afloat out of the water if it strikes squarely against the side or deck. The latter reference applies to the suggested use of dynamite dropped from balloons on the decks of a fleet or the heads of an army, a species of warfare that would hardly seem allowable among civilized nations.



CABANAS CASTLE.

The rapidity of loading and firing from a shore battery, fort or other fortification varies with the amount of the explosive in the shell, but the time must not exceed three minutes for one shell of 500 pounds or forty minutes for ten consecutive rounds. For a shell charged with 200 pounds two minutes are allowed or twenty-seven for ten consecutive rounds. The rate of rapidity continues to increase with smaller charges, as many as ten rounds in twenty minutes being reached. The eight-inch gun will be fired five rounds with fifty and five with 100 pounds in the shell, while the 15-inch will be fired three rounds with fifty, eight with 100, ten with 200 and five with 500.

The pneumatic gun, with its accessories, is quite an elaborate apparatus of hydraulic pumps, boilers, condensers and reservoirs. The guns are so mounted as to be pointed in any direction and to be elevated to thirty-five degrees. The latter can be done either by hand or by pneumatic, hydraulic or electric power. It is obvious that some of the objections raised against the use of such a form of armament on shipboard do not apply to its use in forts. There is more room for it, and it no longer has the unstable platform given by the rolling and pitching of a vessel in a seaway. It can likewise be so protected in a fort as to occasion less fear of its demolition by an enemy's fire. Regarded as an aerial torpedo, it has a far greater range than the submarine torpedo, and it may either strike upon the deck of a vessel or explode beneath the keel.

Recent experiments have convinced the best students of ordnance that the use of dynamite justifies the expenditure of millions of dollars where thousands have previously been expended. The dynamite gun can be used in fortifications as a torpedo defense of a harbor, or, in swift-moving torpedo-boats, as a defence of men-of-war against movable torpedoes or for siege operations on land by regular approaches. The application of the dynamite principles of ordnance to a class of guns, light, easily manipulated and quickly moved, will in all probability eventually displace field artillery. Dynamite guns may be mounted upon a fast unarmored vessel or a whole fleet of them and the giant-powder shells shot into the enemy

with such fierce rapidity as to quickly render him helpless. Virtually the expense of armor and heavy steel guns is rendered unnecessary by the use of pneumatic dynamite guns, at least so far as "inshore" fighting is concerned.

The war in Cuba may be primitive in its general methods, as it has been barbarous in its butchery, but it has had a modernized aspect in the use of dynamite and other explosives as weapons of offence and defence. To the dynamite gun used by the insurgents in the western province, Pinar del Rio, may be attributed more that to anything else the noteworthy successes of Maceo a year and a-half ago, and lately with the dynamite guns successfully landed from filibustering expeditions near Nuevitas, General Gomez has been able to push his forces more valiantly on toward the environs of Havana.

Invisible bullets, though deadly in their effects, seem trifles in comparison with a dynamite shower of liquid devastating fire. It is little wonder that the Spaniards have been invariably defeated when they have been forced to make a stand against such implements of destruction, and if the Cubans with only on gun at first were able to excite terror in the hearts of their antagonists the world can easily imagine what batteries of six, twelve and twenty guns, as are to be found at many defensive points of the United States, will be able to do in execution when the demand is made upon them. The excessive slaughter that will follow will appear more like wholesale murder than the stereotyped "civilized warfare." But, at any rate, the use of these weapons by the Cubans has satisfied the military mind of their value for offensive purposes.

The guns at Sandy Hook have proved that dynamite can be thrown with safety by means of compressed air, and by the use of this system the projectile is discharged without shock.

Brig.-Gen. Daniel W. Flagler, chief of ordnance, is convinced that dynamite will play a considerable part in the warfare of today. He subdivides the difficulty of handling the substance into two heads, saying that it is necessary to first obtain an explosive of the highest order that can be fired safely—that is, without danger of explosion from the shock in

the breech of the gun—and, second, one which will not burst from the shock of impact, but at such time after impact as may be desired by the gunner. He adds: "We now use high explosives or dynasub-marine mines and torpedoes. These form a part of our system of coast defence. The compressed-air guns (thus he terms dynamite guns) are built to discharge large charges of high explosives, and tests have demonstrated their ability to do this work. What we desire, however, is to obtain some system by which the explosives can be fired long distances. The simple compressed-air method fails to give this result. I believe that a system will be found in the near future which will satisfactorily answer all requirements."

In the light of subsequent developments in this direction the words of General Flagler appear to have been almost prophetic. The Sims-Dudley gun which the Cuban insurgents have been using for a couple of years against their Spanish oppressors appears to meet the views of the chief of ordnance in their broad aspects. This gun is loaded with powder, which, when exploded, compresses the air, which in turn expels the dynamite with absolutely no danger to the manipulator of the piece. It can be operated by the veriest tyro, as has been proved by the fact that many of the gunners in Cuba who have handled them have been farm hands who have never previously seen anything more deadly than a machete.

There has just been brought out a new form of this dynamite gun which is a great improvement over those in use in Cuba. Although so deadly that everything within a distance of forty feet of the point of impact of the projectile is smashed to atoms, the new gun is very simple in construction. Under the tube from which the projectile is fired is another connected with it. In this is placed a charge of smokeless gunpowder. When fired, the powder compresses the air to such an extent that the projectile is hurled to a distance of about three miles.

The projectile is a long tube, which contains a cap that is fired by an ingenious arrangement when the projectile strikes either earth or water. The cap sets fire to a layer of fulminate of mercury, which in turn ignites some gun cotton. The gun

cotton fires the explosive gelatine, which explodes the projectile. This gelatine, though very destructive, cannot ignite with heat below 375 degrees. This explains the present layers of explosives.

Mr. Sims has offered to equip 100 or more tugboats for the government with these guns, and guarantees that with them the coast can be kept perfectly clear of foreign warships. They are especially adapted for this sort of work, for the gun, besides being smokeless, is practically noiseless, emits no flash and has no recoil. These points render it of peculiar advantage for use on tugs or other small craft.

But the dynamite "projector" will be used in other locations than on our coast fortifications. "The United States Steamer Vesuvius,. With Special Reference to Her Pneumatic Battery," is the title of a prize essay by Lieutenant Commander Seaton Schroeder, U. S. N., at one time in command of that vessel. He admits that she was designed simply to carry the guns and to satisfy the popular and somewhat erratic cry for great speed and that the latter object was attained at the sacrifice of other features.

A strong point in favor of the pneumatic gun is this: The torpedo strikes under water, the armor-piercing shell attacks the portion of the hull above water, but with the shell from the dynamite gun any hit "counts."

The most advantageous position for a pneumatic-gun vessel is held to be either ahead or astern of the enemy, and while it may be rarely possible for a single ship to choose its position, vessels of this class, hunting in couples, which is the best of tactics, should find little difficulty, by separating, in getting their victim in the most favorable position for delivering a fatal blow from one or the other.

The United States Government, recognizing this fact and proposing to have these death-dealing monsters hunt in couples, has lately purchased from Brazil the dynamite cruiser Nictheroy. Formerly she was the American steamship El Cid, but when the provisional war fleet for Brazil was organized in 1893 she was rechristened the Nictheroy, and it was her

TRAINING SHIP—GATLING GUN PRACTICE.

dynamite gun which was relied upon to quell the rebellion in the South American republic. Her late arrival, however, precluded the testing of its value. This gun has a bore of fifteen inches and throws projectiles carrying fifty, 100, 200 and 500 pounds of nitro-glycerine, the range of fire varying according to the weight. The officer commanding this gun is able to swing it around and to change the elevation by means of electric machinery. The dynamite guns on the Vesuvius are fired by the officer in the conning tower, because they are fixed in the hull and must be controlled by the one who steers.

On November 19, 1893, it was stated that Old Glory came down forever from the Nictheroy and the flag of Brazil was raised to the peak, but the stars and stripes float again from her main peak. The Nictheroy is a steel vessel, and her one screw propels her at the rate of nineteen knots an hour. Her engines and boilers are protected by coal, and her armament consists of the one Zalinski 15-inch pneumatic gun, one 4.7-inch and two 3.9-inch rapid-firing guns, eight six-pounders, ten one-pounders and four Howell torpedo tubes. The efficiency of the pneumatic weapon, hurling colossal explosive missiles, is beyond question. The modern high-power rifle will probably continue to be the foremost implement of war, but not nearly so much damage is done with it at sea as one would be apt to infer from provoking ground firings. This is demonstrated in the comparatively slight injury done to the Huascar in her gallant conflict with two Chilian ironclads and the disappointment felt at the inadequate results of the bombardment of Sfax, Tunis, by the French fleet in July, 1881, and of the Alexandria (Egypt) forts by the British fleet in 1882.

In battle the crew of the Vesuvius would embark on their errand of death with many chances against a safe return. She carries an enormous supply of dynamite, and a hostile projectile correctly aimed would explode this, leaving not a trace of vessel or men. She will either hurl dreadful but sudden death upon her enemies or suffer annihilation, perhaps both. Should a rapid movement be made against any port the Vesuvius will precede our fleet, exploding all the mines and craft that she can reach. Her three 15-inch guns will distribute ex-

plosive shells 100 feet apart, the fuses being regulated so as to explode only after the bottom of the channel has been touched. Every hidden torpedo, mine or submarine battery within fifty feet of each explosion will be destroyed, and at each simultaneous discharge of the three guns there will be cleared a safe channel 300 feet wide and 100 feet long over which our warships may safely steam. This submarine plowing, by the way, costs $90,000 a mile. The terrible guns of the Vesuvius can, moreover, drop a 100-pound charge of gun cotton into a fort two and one-half miles away or a 500-pound charge the distance of one mile.

The submarine boat Holland has given satisfactory tests, and will probably prove a dangerous antagonist in a sea fight. Our latest purchase is what the British call a "torpedo chaser," of the Yarrow type, named the Manley. She is built more for speed than destructiveness, her rate being thirty-two knots per hour. Her length is fifty-four feet, beam 9.3 feet, and her draft astern 3.8 feet. She does not run entirely under water, but so low that her decks will be awash. She is painted a dull lead color, and when tearing through the water at her maximum speed it will be almost impossible for a foe to put a shot into her.

In striking contrast to these vessels is the great ram Katahdin, which has been compared to a bee, as it is said she will immediately lose her own life after inserting her sting. Then there is our little fleet of torpedo-boats. These are in greater danger of destruction than any craft on the sea, and the most of them, if they should be forced into an open battle by day, will be fortunate to get out alive. During attacks under cover of darkness there will of course be less danger, but in all their hostile movements their only safety will lie in the avoidance of the rapid-fire guns of the battleships which at the time they may happen to be "hunting to the death."

At the present time, when the subject of dynamite is interesting almost every one who has a spark of martial feeling in his soul, it may not be amiss to explain its appearance and process of manufacture. Dynamite, or giant powder, the invention of

Alfred Nobel, of Sweden, can be made into cakes, or it may be converted into a sticky paste called "explosive gum," or enveloped in cases of paper, pasteboard or metal to form cartridges. It is a desiccated mixture of three liquid ingredients—nitric acid, sulphuric acid and glycerine—combined with sawdust or some similar substance, the compound constituting a mass resembling damp graham flour or pale cocoa. To some it appears like coarse brown sugar. "Explosive gum" is of pure nitro-glycerine and gun cotton more highly charged with nitrate.

The pulverized form prevents the transmission of ordinary shocks except under pressure in a confined space. The pressure of the inert mineral constituents serves likewise to absorb heat, and consequently a high temperature cannot be readily imparted to the whole, but when imparted this temperature effects a great expansion of the gases and increased effectiveness of explosion.

Ignited in the open air, dynamite burns quietly with nitrous fumes. Exploded, usually by means of a fulminating fuse or cap, it gives off carbonic acid, nitrogen and hydrogen, with little or no smoke, leaving only a white ash. Under favorable conditions the effectiveness of dynamite is always at least equal and frequently superior to that of nitro-glycerine, for the latter is liable to scatter unexploded drops by reason of the maximum rapidity of its ignition.

Dynamite is now recognized as the safest of all high explosives. It is not affected by a prolonged temperature of 100 degrees centigrade, nor is it as dangerous as nitro-glycerine when it solidifies at eight degrees centigrade. Neither light, electricity nor ordinary shocks, contrary to the popular fallacy, cause it to decompose or explode. The principal dangers connected with its use are those arising from the strong fulminating powders used in the percussion fuses to explode it. It is also possible that if dynamite is carelessly made it may contain an excess of nitro-glycerine, which, overcoming the capillary force of the mineral particles, may collect in drops and settle from the mass, becoming a source of serious acci-

dents. Moreover, it may be that freezing or thawing after freezing has a tendency to segregate the oil.

In the pine woods of Southern New Jersey, far from any human habitation, there are several dynamite factories, which are harmless-looking structures, as they are scattered frame buildings, generally one story high and remote from one another. In Europe there are many notable factories in France and other countries, but the most famous one is at Isleten, in Switzerland. The work there is principally performed by women and girls.

In the retail stores of the United States where dynamite is for sale there is no unusual precaution taken in the storing of it.

It is the cap and the cartridge used in connection with dynamite that are so often confounded in the accounts of explosions, etc. The prevailing idea about the anarchist Lingg's death is that he exploded a cartridge in his mouth. Instead it was the much smaller but just as deadly cap.

The common domestic article retails at from twenty-five to sixty cents a pound, according to the proportion of nitroglycerine to sawdust or lampblack.

Gun cotton is an explosive substance obtained by subjecting common cotton to the action of strong nitric acid. Several products are known under this name, possessing distinct proportions, though differing but little in constitution. The well-known detonating gun cotton is insoluble in common ether or alcohol, and is not attacked by acetic acid, but is capable of being dissolved in acetic ether. Gun cotton is not readily distinguishable in appearance from the untreated article, but it is slightly harsher to the touch.

When wet, it may be kept for an indefinite period without change, and whether wet or dry it is affected by very few reagents. Its stability is superior to that of gunpowder in every respect except in the all-important one of immunity from explosion. Repeated accidents have destroyed the confidence of all but the very sanguine in its safety. It was for a long time supposed that the ingenious process of F. A. Abel has removed the causes of distrust, but many subsequent accidents,

Speed, 19 Knots. RALEIGH (Protected Cruiser). Cost, $1,100,000.

and especially the terrible and unexpected explosion at Stowmarket, England, in 1871, have not lessened the almost universal fear.

If massive gun cotton be ignited by a coal or flame of low intensity, it burnes in the open air inexplosively; if fired by a powerful flame, it flashes like gunpowder, but if ignited by a fulminate, as in the case of the torpedo, it detonates with tremendous violence. This "sympathetic" quality is difficult to explain. It cannot be successfully used as an agent for the propulsion of projectiles and will never be a perfect substitute for gunpowder in military operations. There is a new gun cotton, for which much is claimed, manufactured in Wolverhampton, England, whose composition is unknown. It is called "gadoxytine."

The point for consideration is that dynamite may be fired as a naked body, while gun cotton is always inclosed in the torpedo, thoroughly protected, and explodes from the impact of the protecting shell, or torpedo case, against a resisting object, naturally in time of naval warfare the sides, keel and hull of a vessel or battleship.

September 20, 1887, Lieutenant E. L. Zalinski, of the United States Army, now a captain on the retired list, gave his first successful demonstration of the experiments he had been for some time conducting at Fort Lafayette, New York bay, with his invention, the pneumatic dynamite gun. Secretary of the Navy Whitney and members of the ordnance committee were present. The doomed old coast survey sailing vessel Silliman, which had outlived its usefulness and was to end its marine existence in the presence of a distinguished and admiring crowd, was anchored just below the Narrows, about a mile and a-quarter from Fort Hamilton. Shortly after 3 o'clock there was a trial shot. A whizzing noise was heard, a long-drawn-out "zo-oo-oo-ee-ee," very much like that made by a rocket, and a jet of water rose in the air thirty feet astern of the starboard quarter of the Silliman. There was no dynamite in this or in the second shell, which fell eight yards to the starboard side of the vessel. The third shot, with more pretension in the sound and movements—the projectile contained fifty-five

pounds of explosive gelatine—shattered a mast. The fourth shot made a terrific noise as it exploded, the spray was intermingled with spars and small pieces of wood and blackened with smoke, and the Silliman, struck directly under the middle of the hull, was lifted bodily out of the water and wrecked completely.

Quite different in the results was the testing of the great Justin dynamite gun at Perrysville, in the vicinity of Syracuse, N. Y., on May 27, 1890, when the gun bursted into a thousand pieces and scores of people narrowly escaped instant death. But it was an old gun that had served the Confederacy during the Civil War for a field piece, and was naturally weakened by long use. The dynamite shell upon which Dr. Joel D. Justin based his patent is nine inches in diameter and forty-four inches long. It incases several wooden boxes containing dynamite. About thirty pounds of compressed cannon powder are necessary for each discharge.

Gathmann's dynamite gun is also considered a terrible engine of war, but as it throws a torpedo shell it should properly be termed a torpedo gun. One of them, he claims, of the same weight as the ordinary 12-inch modern piece, will throw 1500 pounds of high explosive accurately a distance of nearly three miles. No ship or fortress in existence could withstand the shock of a single impact, and the rock of Gibraltar would crumble, with the garrison, into the Mediterranean under a day's bombardment.

The torpedo shell is a copper cylinder, large, tapering and thin, packed with wet gun cotton. At the center of the forward end is placed a considerable quantity of dry gun cotton, the wet material being packed closely about it. At the forward end of the dry explosive is some fulminate, from which, at the point of the torpedo, runs a train of powder to some percussion caps that cock up a bit of pointed steel, which in turn tips the projectile. This pointed bit of metal striking an object explodes the percussion caps, the train of powder is fired, the dry gun cotton batching explodes the entire mass about it, and the destruction of everything within reach of the giant force follows.

The Zalinski gun is seventy-five feet long, or nineteen feet longer than the Krupp 125-ton gun, and naturally much less in weight, as it is simply a pneumatic tube. With 2000 pounds pressure this piece of ordnance will send 100 pounds of dynamite one and one-half miles at a speed of 1400 feet a second. This produces upon the object struck by the shot an instantaneous pressure of about 6000 pounds per square inch. The cost of the gun is slight, its manufacture does not require any special plant, and in exigencies it can be made rapidly.

CHAPTER XXI.

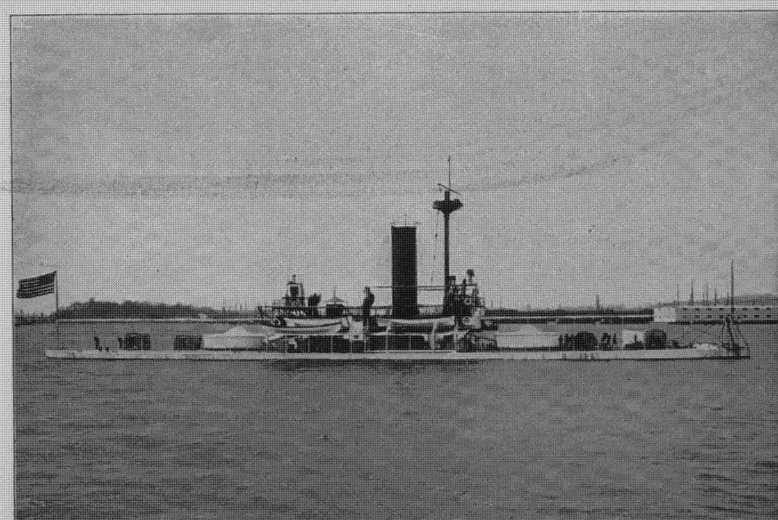
GOVERNMENT OF A MAN-OF-WAR.

HOW DISCIPLINE IS MAINTAINED ON THE SHIPS OF THE UNITED STATES NAVY.

The development of steel, steam and electricity may be said to constitute three paramount factors in the up-to-date standard which distinguishes the United States Navy of the present time, but an equally important attribute to which may be ascribed the marvelous degree of efficiency which characterizes this mighty arm of the service is the splendid discipline which is maintained in its various departments, and particularly on board its war vessels.

The peculiar conditions existing in the naval service render an invincible system of government indispensable to the preservation of good order and reliability, and to this end the utmost energy is exerted by those in authority in the enforcement of the rules and regulations affecting the organization. In no other instance has this democratic government conferred upon individuals so wide and extensive a range of power to be exercised discretionarily, as in the naval service, yet the abuse of this authority rarely if ever occurs, to which circumstances may be attributed the unexceptional deportment prevalent throughout its forces.

The articles for the government of the navy, which consist of some 5000 words, are carefully read to every person prior to his being sworn into the service and to all hands assembled at muster on the first Sunday of every month, in addition to which a copy is posted in a prominent place on board each of its vessels. These articles apply to all persons serving in the regular navy, from the most exalted Rear Admiral down to the lowliest enlisted man, and any violation of their precepts is punishable without partiality or respect to rank.



Speed. 10½ Knots. MIANTONOMOH (Monitor). Cost. $3,178,046.

To begin with, they provide that the commanders of all fleets, naval stations and vessels acting singly are required to show in themselves a good example of honor, patriotism and obedience; to be vigilant in inspecting the conduct of all persons who are placed under their command; to guard against all dissolute and immoral practices, and to correct those who are guilty of them. They further stipulate that such punishment as a court-martial may adjudge may be inflicted on any person in the navy who is guilty of drunkenness, falsehood, theft or other scandalous conduct tending to the destruction of good morals; or is guilty of oppression or maltreatment of any one subject to his orders; or quarrels with, strikes or menaces any person in the navy; treats his superior officer with contempt or is disrespectful to him in language or deportment; or associates himself with any mutinous combination to weaken the lawful authority of his commanding officer; or in time of peace deserts or absents himself from his station without leave.

When the crew of any vessel of the United States are separated therefrom by means of her wreck, loss or destruction, all the command and authority given to the officers of such vessel remains in full force until such ship's company is regularly discharged from or ordered again into service; and all offences committed by persons belonging to the navy while on shore are punishable in the same manner as if they had been perpetrated at sea.

Particular emphasis is given to such provisions in the articles as relate to discipline in time of war, in which instance the penalty of death may be inflicted upon any person in the navy guilty of the following offences:

Willful disobedience of orders or the violation of a trust, clandestine intercourse with an enemy or rebel, sleeping while on watch, intentionally suffering any vessel of the navy to be stranded or run upon rocks or shoals or improperly hazarded, the willful injury of such vessel or any part of her tackle, equipment or armament, whereby the lives of the crew may be exposed to danger, or upon any one who strikes or attempts to strike the flag to an enemy or rebel, without proper authority,

or, when engaged in battle, treacherously yields, pusillanimously cries for quarter, displays cowardice, negligence or disaffection, or withdraws from or keeps out of danger to which he should expose himself; or, being in command of a fleet, squadron or vessel, acting singly, neglects when an engagement is probable or when an armed vessel of the enemy is in sight, to prepare or clear his ship or ships for action, or does not, upon signal for battle, use his utmost exertions to join in the engagement, or fails to encourage, in his own person, his inferior officers and the men to fight courageously; or does not do his utmost to overtake and capture or destroy any vessel which it is his duty to encounter. All persons who, in time of war, come or are found in the capacity of spies, or who bring any seducting letter or message from an enemy, or endeavors to corrupt any person in the navy to betray his trust, shall suffer the punishment of death. This same penalty may be adjudged upon any person found guilty of the crime of murder without the territorial jurisdiction of the United States.

A naval court-martial may adjudge the punishment of imprisonment for life, or for a stated term, at hard labor, in any case where it is authorized to fix the sentence of death, and such sentence may be carried into effect in any prison or penitentiary under the control of the United States. No commander of a vessel, without the prior judgment of a court-martial, is authorized to inflict upon a commissioned or warrant officer any other punishment than private reprimand, suspension from duty, arrest or confinement, the latter not to continue longer than ten days unless a further period be necessary to bring the offender to trial. Nor may he, of his own volition, cause to be inflicted upon any petty officer or person of inferior rating, for a single offence, any other than one of the following punishment: Confinement, with or without irons, single or double, not exceeding ten days. Solitary confinement, on bread and water, not exceeding five days. Reduction or any rating established by himself, deprivation of liberty on shore, or extra duties.

In no case may punishment by flogging, branding, tattooing

or other bodily suffering, as in former times, be adjudged by any court-martial or inflicted upon any person in the navy.

General courts-martial may be convened by the President, the Secretary of the Navy or the commander-in-chief of a fleet or squadron. The number of officers necessary to constitute a court-martial must not be less than five or exceed thirteen, and when the defendant is a commissioned officer at least one-half the number must be his equal in rank. The senior officer of the body always presides, and the others take place according to their rank. Upon convening the president of the court administers a special oath or affirmation to the judge advocate, and each member, the remaining details being conducted in much the same manner as jury trial on shore.

Upon the findings being announced, the ship's company is immediately assembled on deck and the prisoner brought to the mast. The executive officer then observes the formality of reading the charges and specifications aloud to the crew, closing with the pronouncement of the sentence fixed by the court.

In proportion to the size of the navy courts-martial are a rare occurrence, being rapidly on the decline as the efficiency of the service increases, and it is safe to predict that the time is not far distant when the corrective measures observed on shipboard will be limited to the police court proceedings which daily transpire at the mast, for the investigation of minor offences, such as must always be unavoidable in the best-regulated organizations.

CHAPTER XXII.

GENERAL GREELEY WRITES OF MILITARY BALLOONS.

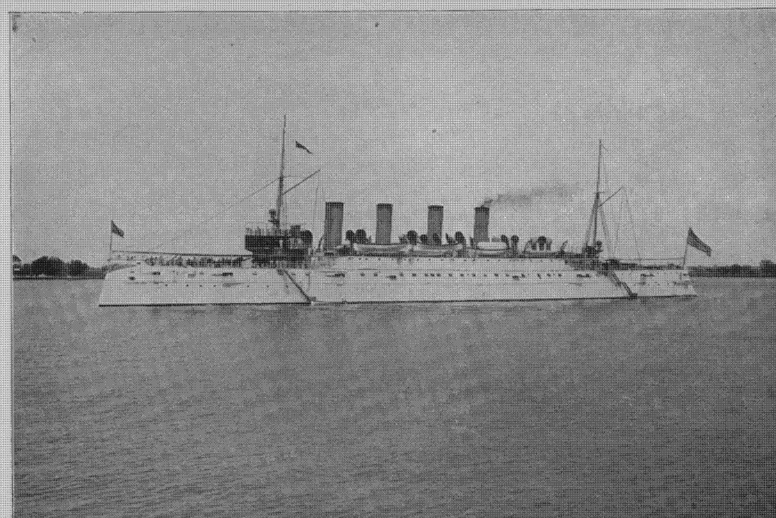
HE SAYS THEY HAVE PASSED THE EXPERIMENTAL STAGE AND ARE NOW A MOST IMPORTANT FACTOR IN WARFARE.

Whether the hostilities in which the United States may at some time be engaged take place on land or sea, the balloon is sure to occupy an important position, to be a factor which demands consideration. The improvements in the navigation of the air which each year has witnessed have caused the balloon to pass beyond the experimental stage and to become one of those things which are recognized as being no longer chimerical but practical in point of results.

From the lofty heights in which the modern balloon is at home it would be possible to locate the position of the enemy's ships at sea, where otherwise it would be impossible to distinguish them even from an observatory. The United States was the last almost of the great powers to take the question of balloons in warfare as a serious one, but even though our experiments have been conducted in a small way, they have clearly demonstrated the utilty of the balloon corps.

It is now possible to navigate the air with a very great degree of certainty in point of direction—several hundred per cent. more than a quarter of a century ago, when John Fitzjohn Porter's ideas on this subject, which first materialized early in the war of the Rebellion, began again to assume prominence. Navigating a balloon in the present day is much like the navigation of a ship, only we have learned to navigate the air instead of the ocean.

The utility and importance of balloons for obtaining military information during field operations were demonstrated by General Porter, but, like many other American ideas, such



Speed, 23 Knots. COLUMBIA (Protected Cruiser). Cost, $2,725,000.

as repeating arms, etc., the military balloon proved too advanced for the time, and had to await recognition and development by the military authorities of other nations. Yet while we were the last of all the powers to take up the question of balloons seriously, we were, as a matter of fact, the first to use balloons in war, just as we were first to use electrical telegraph and signal appliances on the field of battle. We have, however, been outstripped in the development of the military balloon by other important military powers who have adopted and improved it.

These improved methods of equipment, manipulation and transportation have come with the general improvement in industrial and inventive methods. But to the present day there have been no experiments sufficiently satisfactory to prove the advisability of replacing the captive balloon of General Porter by free balloons, either for extended reconnoisances or for extensive warfare, although the important part to be played in future wars by free dirigible balloons or by flying machines is unquestioned. Mr. Maxim, the great experimentalist, is justified in saying:

"When the flying machine finally succeeds, its first great use will be for military purposes. It will at once become an engine of war, not only to reconnoiter the enemy's position, as has been attempted by so-called dirigible balloons, but also to carry and discharge into the enemy's lines and country large bombs containing high explosives."

To return to our immediate subject, extensive and continued experiments have brought the use of the captive balloon to such a degree of excellence that its utility in any extented warfare is evident. The efforts to construct a dirigible balloon which can be managed so as to have its movements under satisfactory control, have so far been inconclusive. There is no question that Julien Giffard, Tissaudier, Campbell and other private inventors, have constructed balloons which have actually been propelled in any desired direction.

Captain Fullerton, a member of the Royal Engineers of the British Army, has pointed out that a satisfactory war balloon must carry three or four passengers, explosive shells, a ma-

chine gun or two, and be able to travel about thirty miles an hour in calm weather. The balloon should have a lifting capacity of about 5500 pounds, of which 1700 should be in passengers, instruments, explosives and ballast. The French military dirigible balloons, known as the Challais-Meudon, were successful at a low rate of speed, only in calm weather, and with a toal weight of 2400 pounds, were able to carry only 310 pounds of passengers and 470 ballast.

The experiments of such able scientists as Professor Langley, in the United States; Colonel Duchemin, the French engineer, and Mr. Maxim, have convinced many intelligent men of the practicability of aerial navigation by airships heavier than air. The future success of such navigation now awaits a motor considerably lighter than those at present in use. It may be that the successful experiments made by Professor Langley in flights with his aeroplane indicate that the solution of this interesting and important problem is not far distant.

I am firmly convinced, however, that our own experiments will prove, even if we have small opportunity to act in the matter beyond the stage of experiment, that the balloon must be classed among the mightiest engines of war. Certainly it's utility cannot be questioned by any one who thoroughly understands it. Our own field train has been in operation at Fort Logan, Col., under the supervision of Capt. W. A. Glassford, of the Signal Corps. The balloon is of silk, and of 14,000 cubic feet capacity. Then there is a balloon wagon, with cable drum, captive cable and accessories complete, four tube wagons and accessories, one service wagon, a gas-generating apparatus, a compressor for impounding gas in tubes, and 180 steel tubes in which gas is compressed to one-hundredth or one-hundred-and-twentieth of its value.

The ideal balloon for war purposes is not simply one in which observers may rise to a considerable height, look down on the enemy and then wait until a return to earth is made to report, but one in which constant communication can be maintained between the aeronauts and their friends below. This, of course, is only applicable to the captive balloon, and I do not

intend to convey the idea that it applies otherwise. The communication must be brought about through a double conductor insulated captive cable, such as that now in use by the English balloon corps. It ought to be possible for a balloon to rise 2600 feet and for the signal officer from this point of vantage to communicate by telephone either with the train base or over the flying telegraph line with the commanding general. We have tried a series of these experiments at Fort Logan and met with pronounced success.

I am not attempting to deny in any way the advantage of the dirigible balloon, meaning by that a balloon which can be governed, directed or steered. In event of a desire to take nautical observations from a balloon, dirigibility would, of course, be an absolute necessity, and in that event we would be obliged to dispense with any communication with the earth below. I firmly believe that the day is not far distant when it will be entirely possible for balloons to journey a dozen miles out at sea with perfect safety, and act in a measure as sentinels to warn those on shore of the aproach of an enemy long before that enemy would otherwise be visible. No ship or steamer could possibly return with intelligence of the coming of the foe with anything like the speed with which the balloon could journey.

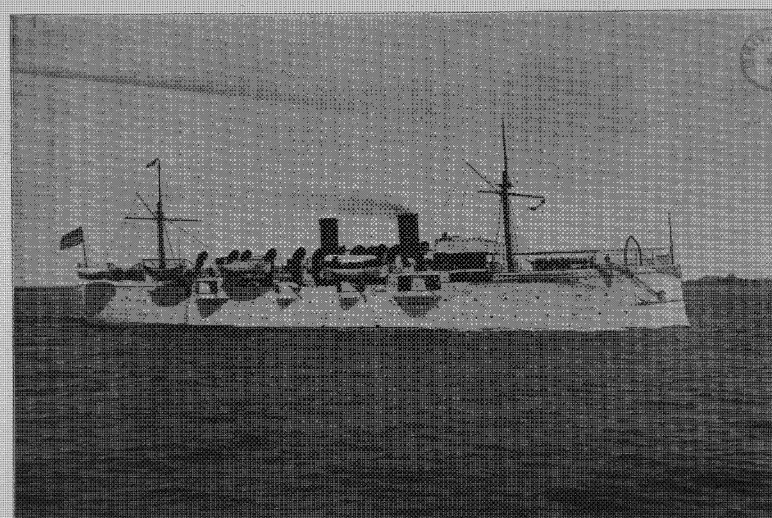
In military operations it seems to me the captive balloon is the most practicable. This was the view taken at the time of the social disturbances in Chicago several years ago. The commanding general at that point requested that the military balloon now at Fort Logan, then stationed at Fort Riley, Kansas, should be sent there. Indeed preparations to that end were made, but the lessening of the trouble rendered the action unnecessary. General Miles realized at that time that the use of a military captive balloon in a great city would afford exceptional advantages for observing the movements of hostile forces, which, even from the tops of the highest buildings, are otherwise hidden from observation, save when they cross streets at right angles to the point of observation.

With a balloon say 1000 feet in the air, not only the presence but the line of action of such forces can be observed and fol-

lowed, and information thereof transmitted by telephone over the balloon cable to the commanding general, who would thus be able to move, without loss of time and in the most direct line, suitable bodies of troops to checkmate possible movements. Under present conditions officials are forced to wait until reports of actual violence are made, and the troops harassed and fatigued by marching long distances to points which in the meantime are evacuated, the damage having been done. I think it is plain to any one that the utility of the captive balloon in such cases would be very great.

In great measure the case would be similar in military operations in the field. Let us suppose that the campaign was taking place in a wooded, or mountainous section. Under such circumstances the only information which could be gained, following the ordinary tactics, would be by means of scouting parties, the most reliable of which are always uncertain. If a balloon train were attached to a telegraph corps, as it is in our army, the balloon could be allowed to rise a distance of a half mile, practically beyond reach of the cannon, owing to the non-utility of artillery for bombarding the heavens to sheel the balloon. It is true that it might be possible for a rifle ball to reach that distance, but the chances of being hit would be very small, and a properly protected balloon would be impervious to a rifle shot at that height.

From this point of vantage, the enemy's lines and position could be observed in detail. Therefore I say that the future of the balloon in warfare is very great. The obstacles of other days have largely been removed, and the paraphernalia required to successfully operate a balloon train can be transported with the army with less trouble than it required to move a battery of artillery.



Speed, 19½ Knots. PHILADELPHIA (Protected Cruiser). Cost, $1,350,000.

CHAPTER XXIII.

CLASSES OF CRUISERS.

HOW THE VARIOUS TYPES OF CRUISERS DIFFER AND THE PURPOSES FOR WHICH THEY ARE DESIGNED.

The term cruiser used to apply, in the days of sailing ships, to the frigates—the type next most formidable to the old line of battleships—and was intended to compass the speedier of the heavy fighting craft delegated to the particular service of hunting up the enemy or preying upon his commerce, and, with certain technical modifications, practically all of our large, swift, unarmored vessels of the late war were so classified. The gunboat was then, and now is, the small vessel of moderate speed and gun power, unmarked for special service by any peculiar characteristics of either offence or defence.

With us the gunboat has a maximum displacement or total weight of something just over 1770 tons and a minimum of 839 tons, the Castine and Machias representing the major extreme and the little Bancroft representing the minor extreme.

Of the simple or unprotected cruiser type we have three—the Detroit, Marblehead and Montgomery—each of a trifle over 2000 tons displacement. When these vessels were first designed they were officially known as gunboats, but the department wisely saw that a limit must be drawn somewhere, and, placing the gunboat limit of size to craft under 2000 tons, the three vessels at once became dignified as cruisers. Besides their promised speed and their fulfillment in reaching over eighteen knots reasonably made them deserving of the title in conjunction with their pretty heavy batteries of rapid-fire guns.

The simple or unprotected cruiser, in common even with gunboats, has no protection in the shape of armor for her "vitals," as her engines, her boilers and her magazines are

called. She has a water-tight deck, though, of moderate plating, which extends from side to side and from bow to stern, completely roofing over the "vitals." While not proof against even moderate shot, this deck prevents the admission of water below which may come in through breaks in the plating above this deck, and in that materially aids in preserving the stability of the craft if pierced by shell just above the water line, but near enough to admit water in careening. So far as possible coal is placed upon this deck and against the sides as a bulwark against the attack of an enemy, and while the coal remains there it forms a good defence to guns ranging from one-pounders to six pounders. The armored shield borne by some of the guns or the armor plates about some of the gunports is not considered protection to the craft herself, and while either may be present on a simple cruiser the fact that her vitals remain undefended makes her an unprotected cruiser.

The protected cruiser is the next advance upon the simple cruiser. Here, again, we have a water-tight deck, but this time it is supplemented with a coat of mail and may range on the flat portion from one inch to two and one-half inches, and vary on the slopes at the sides from one and one-half to four and three-quarter inches. This armor presents a deflective front to shot passing through the sides and threatening the magazines and the motive power, and, of course, gives the vessel the power of standing up before craft capable of dealing out certain destruction to the simple cruiser. Again the coal is stowed along the sides above and below the water-tight and protective deck, and a new defence, in the shape of a band of cellulose, stands ready to take the first shock of attack and to plug automatically by its own swelling all shot holes admitting water. Of course, it is not proof against explosive shell, which may displace it rather than merely pass through it.

Of the protected cruiser type the Olympia is by long odds the most typical vessel in our service. Aside from her hull protection, the guns of her main battery, four eight-inch guns, are mounted in two turrets, an all-around shelter unequaled by any ship of like class and size in the world, and some notion of what this and the other phases of this 5800-ton ship's

defensive qualities constitute may be gathered when it is realized that she could stand up and give a good account of herself against either the British Powerful or Terrible—ships of over 14000 tons displacement.

The armored cruiser represented in our service by the New York and Brooklyn is the protected cruiser bettered by slightly heavier armor on her protective deck, slightly heavier armor about her turreted guns and the presence of a band of water-line vertical armor and plating of from three to four inches on her sides just above this heavy belt. This water-line armor is placed amidships and reaches fore and aft throughout the region occupied by the vitals. As can be seen, the armored cruiser is a larger and heavier protected version of the protected cruiser, and, again, able to withstand blows that would render an unprotected, or even a protected, cruiser defenseless in a very short while. She has great speed—in the case of the two vessels named fully twenty-one knots—and she is, as the old wooden frigate was, the next most formidable craft to a battleship. In battle she may take her place in the line and bear with the slower, but more powerful, ships a fair share of the enemy's attack, but her special service will be to look up the enemy's armored cruisers—not battleships—or the larger of her protected cruisers and give battle with a reasonable assurance of victory.

The armored cruiser is the cavalryman of the sea, and to them will fall that service demanding dash, force and quickness of execution.

The protected cruiser is really the commerce-destroyer, and is coated with just enough mail to give her a preponderance of defense over the armed escort probably detailed to watch over an enemy's merchant craft. Swift, of considerable gun power, and of great ease of movement, she is indeed to be dreaded by everything but craft of ample speed, fine protection and good powers of retaliation.

The simple cruiser falls in behind the protected cruiser in the same line of service, but she must be wary lest her quarry be a merchantman of gunpowder or be convoyed by a sturdy craft of speed and superior battery.

CHAPTER XXIV.

MAXIM GUNS UP TO DATE.

LIGHT ENOUGH TO BE MOUNTED WITH TWO MEN ON A TRICYCLE —CAN BE CARRIED BY A CAVALRYMAN IN A HOLSTER OR LIKE A KNAPSACK ON AN INFANTRYMAN.

It will doubtless interest many during present troubles to learn that a number of important improvements or modifications of the celebrated Maxim rifle-caliber gun have recently been introduced.

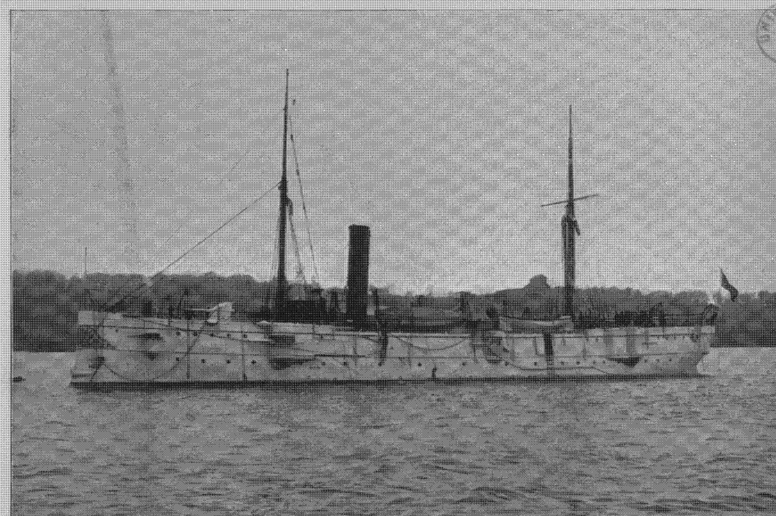
This weapon is one of the most murderous implements of modern warfare. Our huge rifle cannon drive their massive projectiles through plates of steel and thick fortress walls, but the business of this rapid-fire machine gun is to mow down the men in the ranks.

Its action is entirely automatic when once it is started. The cartridges are placed in a belt and are fed into the gun with almost incredible rapidity by mechanism actuated by the recoil of the successive discharges. The gunner has but to press a button, and the weapon itself does the rest, though by releasing the button at the proper moment the action can be limited to a single discharge.

This terrible engine is capable of belching forth from 600 to 700 rounds per minute, sweeping the field before it with an annihilating blast of bullets before which nothing human can stand.

The barrel is ordinarily encased in a water-jacket to prevent excessive heating, though this jacket is in some cases omitted for greater ease of transportation.

The only appreciable pause in this tempest of death is when one belt of cartridges is exhausted and another must be inserted. Even to accomplish this it is only necessary to turn



Speed, 15½ Knots. MACHIAS (Gun Boat). Cost, $318,000.

a crank, push in the end of the new belt from the right and pull it through to the left as far as it will go and release the crank; then another turn, pull and release, and the gun is again ready for its dreadful work. To measurably protect the gunner during this operation a shield of steel plate is sometimes provided.

One of the most interesting of the new features is the mounting of engines of this description upon a tricycle. Of course, such a device is available only where the roads are fairly good. Two guns are used, together weighing fifty-four pounds. The weight of the tripod is seventeen and one-half pounds, and of the necessary spare parts eight pounds more; the tricycle itself weighs 121 pounds. To this must be added eighty-seven and one-half pounds for 1000 rounds of ammunition carried in boxes, making a total of 288 pounds—no trifling load.

Nevertheless, two vigorous riders can drive the apparatus at a very good pace over favorable ground. When a steep hill is encountered the men dismount and push the machine up the slope, using it as a hand-carriage. In an open country this mode of mounting the Maxim may prove of considerable value.

Another form of the gun has been elaborated, designed to be transported by a mule on a specially constructed pack-saddle. This is likely to be particularly serviceable in a mountainous district. By the omission of the water-jacket the weapon may be made so light that it can be carried by a cavalryman in a holster, or even by a foot soldier in a knapsack. In the latter case the weight is reduced to fifty-seven and one-half pounds all told.

CHAPTER XXV.

MODERN SURGERY ON THE FIELD.

BAYONETS AND SCABBARDS AS SPLINTS IN EMERGENCY CASES—THE DUTIES OF THE MEN—SURGEON-COLONEL STEVENSON WRITES OF THE SPLENDID SYSTEM OF RELIEF—TO LESSEN THE HORRORS OF WAR—DISTINGUISHED SURGEON TELLS HOW THE WOUNDED SOLDIERS ARE CARED FOR WHILE THE BATTLE RAGES.

How much depends on the employment of efficient means for affording assistance to the wounded in campaigns can only be thoroughly understood and appreciated by those who have had practical experience of the horrors of war upon the field of battle. Not only the future condition of the victims of war, as regards suffering and the usefulness of limbs, but even the preservation of life itself, is involved in the methods which are made use of for the collecting and succoring of the wounded.

The German medical officers reported, after the war of 1870-'71, that large numbers of men died in the field hospitals three or four days after their admission, not so much from the immediate effects of their wounds as in consequence of the general exhaustion of vitality following on long exposure on the field, which, on some occasions, had been unavoidable. For the prevention, too, of the aggregation of the conditions of the wounds themselves, as well as to insure the possibility of treatment on the lines of modern surgery, it is all-important that wounded men be rapidly picked up and carried out of danger of further injury, to where nourishment can be supplied to them and their wounds attended to.

But, besides this, every feeling of humanity prompts us to aid the wounded soldier at the earliest moment, and to the

utmost of our power, and to place him where he will feel that his comfort and his urgent requirements are certain to receive that care and attention so necessary to his recovery, and so well deserved for so strict an adherence to such a duty as his, carried, as he has carried it, to the extent of risking life itself.

In the armies of every civilized nation in the world the methods to be employed for these purposes are, in modern times, laid down by regulation, and in all they are based on the same general principles, with some slight and unimportant variations necessitated by the circumstances of particular cases.

In former times no systematic methods for the performance of these important duties had been decided on for the English army. Until the year 1877 there was no unit in the British army whose special business was to collect and attend to the wants of the wounded men where they fell upon the field. Even at as late a period as the time of the Crimean War the only men available for the purpose of helping a wounded man off the field were the regimental bandsmen or his comrades in the corps to which he belonged, and no means could have been more inefficient than they. They had never been taught and knew nothing of how to move and carry wounded men, nor, of course, had they any appreciation of the risk wounded men are exposed to when moved by inexperienced hands. Moreover, their comrades in the regiment had other work on hand and were there for other purposes.

THE FIRST BEARER COMPANY.

In the year 1877 a committtee, with the late Sir Thomas Longmore, Colonel Brackenbury and Major Kemmis, R. A., as members, was assembled in London by the commander-in-chief. A scheme for a bearer company was drawn up by this committee, and this was the model on which the bearer company, as at present organized, is based. This bearer company was first tried in actual warfare in the Zulu War of 1879, and (as we learn from Longmore, "On Gunshot Wounds") its "operations were then attended with such success—every

man who fell wounded being at once picked up and carried to the rear for surgical aid—that the Secretary of State for War called the attention of the House of Commons to them, especially to the courage of the bearers, who kept close up to the attacking troops, and to the rapidity with which all the wounded were placed under hospital treatment."

For purposes of description the means for medical assistance of sick and wounded in a campaign, as laid down by regulation, may be divided into three lines:

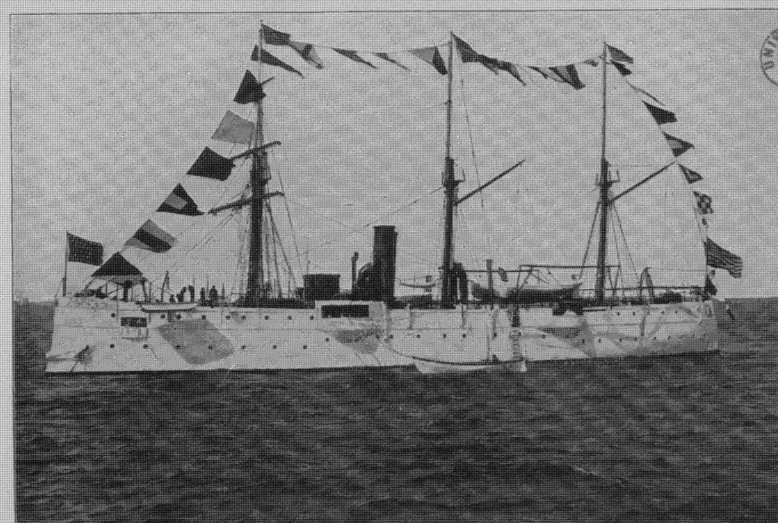
The first line of assistance is composed of the regimental aid and bearer companies.

The second line comprises the field hospitals and the stationary hospitals on the lines of communication, and the third line the general hospitals at the base of operations, and if the base be on a seaboard, hospital ships.

The first line—the regimental aid: When on active service every corps or regiment has a medical officer attached to it during the campaign; four men per squadron, or two men per company, are trained, during peace time, in stretcher-bearer work—how to lift and carry wounded men on stretchers—and in rendering "first aid" to wounded on the field. The medical officer and these trained stretcher-bearers form part of the first line of medical assistance, viz., the "regimental aid;" the bearer company forms the other part.

A bearer company is a body of men composed of the medical staff corps and its reserves (including the militia reserves) especially trained and practiced in affording first aid to wounded men, placing them on stretchers, carrying them to where surgical treatment can be given to them, and in packing them into ambulance wagons for conveyance to the field hospitals. It is commanded and administered by officers of the army medical staff.

The personnel of a bearer company consists of three officers of the army medical staff, one warrant officer, six sergeants, one bugler and fifty-three rank and file of the medical staff corps. Of the latter thirty-two are stretcher-bearers for eight stretchers at four men each, and the remainder are corporals, privates, cooks, servants, etc.



Speed, 14½ Knots. BANCROFT (Special Class). Cost. $250,000.

The transport of a bearer company may be by either "wheel" or "pack." In the former case all the stores, baggage, tents, surgical appliances, etc., are carried in service wagons of different patterns, and in the latter on pack mules. Wheeled transport is used where the nature of the country permits of its employment, and pack-mule transports under other circumstances, as in mountain warfare. When wheel transport is available ten ambulance wagons are supplied for the carriage of the wounded, each capable of accommodating an average of nine men, some lying down and some sitting up. When only mule transport can be used, cacolets and doolies or lushai "dandies" are employed.

HOW THE WORK IS DONE.

The working of the first line of medical assistance on the field is carried out in the following manner: The medical officers of corps, accompanied by the trained regimental bearers (twelve for a cavalry regiment and sixteen for an infantry regiment), carrying one stretcher for every two men, place themselves in rear of the regiments to which they belong. As men fall wounded they are attended to by the medical officer as far as may be practicable, for it is impossible that he can personally treat them all, and carried to a spot under cover, if one be available at a short distance; if not, this first post of assistance must be established under fire in the open field.

The surgical treatment at this part of the battlefield must necessarily be of the most simple kind, for it is distinctly laid down by regulation that the medical officer and the bearers "must not lose touch with their regiments," but must keep close to them, and advance and change position as they do. The duties of the "regimental aid" are strictly confined to those they can perform under these conditions: The application of "first field dressings" (which every officer and man carries on his person) to the apertures in the skin; the rendering of fractured limbs provisionally immovable, so as to prevent aggravation of these injuries by transport, by the use of extemporized splints, such as swords, bayonets, scabbards,

rifles, sticks, etc., all of which are sure to be available; the controlling of serious hemorrhage by surgical means, and, possibly, the injection of morphia in certain cases.

Beyond this nothing can be attempted, because touch with the regiment must be kept up. If, then, a place under cover be available the wounded are carried there; if not, they must be left on the field. In either case they are picked up later by the bearer company.

The bearer company is, in theory, supposed to work in rear of the "regimental aid," but practically the two portions of the first line of assistance perform their duties in the same part of the field, close in rear of the fighting line.

The work of a bearer company during a battle is carried on in three sections, as it were, at the "dressing station," at the "collecting station" and by the stretcher squads in rear of the fight. The medical officer in command selects a place under cover, out of range, or out of the line of fire. Here the dressing station is established. An operating tent is pitched; the surgical equipment of dressing materials, instruments, bandages, etc., is opened out. Antiseptic solutions are prepared, water is boiled and everything got in readiness for the numerous operations which may be required and for the general treatment of the wounded as soon as they arrive. Nourishing food is prepared, and for this purpose a cook forms part of the personnel at the dressing station. A good water supply is almost a necessity, but if one cannot be obtained the water cart of the company must be utilized. All the surgical work at the dressing station is performed by the surgeon-major of the bearer company, assisted by one of the junior officers.

The collecting station is the place where the wounded are carried by the stretcher bearers for transport to the dressing station. It should be as near the fighting line as possible, but under cover or out of the line of fire. The sites for the dressing and collecting stations should be so selected as to have a road between them suitable for the bearer company transport and connecting the former with the field hospitals in the rear, and they should be close together when possible, so as to

lessen the labors of the transport animals. At the collecting station are assembled the ten ambulance wagons for the conveyance of the wounded to the dressing station and on to the field hospitals. The thirty-two stretcher-bearers, with their eight stretchers, forming two stretcher sections of sixteen men and four stretchers each, under the command of the second junior medical officer, set out from the collecting station, pick up the wounded left behind by the regimental aid, carry them to the collecting station, and having afforded such medical treatment as may be necessary, load them into the ambulance wagons for transport to the dressing station.

The surgical work at and in front of the collecting station must, like that of the regimental aid, be of the simplest kind. At this part of the field no operative procedures can be attempted except the ligation of bleeding vessels; fractures of long bones should be put up with extemporary splints, and open wounds should be covered with first field dressings, without being wiped or "cleared" in any way or touched by hands or instruments. If more than this be done at the front infection of the wounds is sure to occur and antiseptic or aseptic surgery, the great object to be aimed at by surgeons in warfare, as well as in civil practice, will be rendered impossible or more difficult at the post further to the rear.

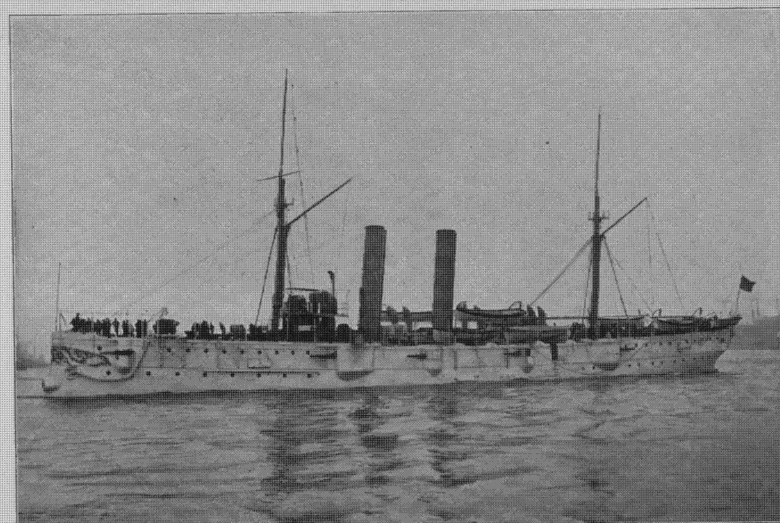
AT THE DRESSING STATION.

The amount and the kind of surgical work which must be performed at the dressing station will largely depend on whether or not the field hospitals are up and in their places. If they are close at hand and ready for the reception of patients, the labors of the medical officers will be considerably reduced; but if not, all the primary surgical work of the battle must be done at the dressing station. In either case all the wounds must be dressed and rendered aseptic; a large number of primary operations will certainly be required; the provisional immobilization apparatus already applied to fractured limbs must be seen to as to its efficiency for its purpose, and

stimulants and nourishment must be given to the patients to recover them from the more or less profound constitutional shock which is usually present. As the patients are dressed they are placed in the ambulance wagons, which, as they are filled, are dispatched to the field hospitals in charge of a corporal and a wagon orderly.

The second line of assistance is composed of the field hospitals and the stationary hospitals on the lines of communication with the base of operations. The field hospitals are lightly equipped, movable hospitals, capable of being easily and rapidly opened out and packed up. They are intended only for the temporary treatment of one hundred patients each, and are supplied with wheel or pack transport, as the nature of the country may render advisable. They are divisible into half-hospitals, each for fifty men, when this may be required. No special hospital diets are supplied to them, the field rations, cooked as the medical officers may direct, and supplemented by such "extras" and "medical comforts" as they may order, being used in them; they are termed "non-dieted hospitals." The bedding consists of a blanket and a waterproof sheet for each patient, no bedstead being supplied. When suitable buildings are available these hospitals may be established in them, otherwise the tents are pitched and they should always be placed as near to the dressing station as possible, so as to shorten the journeys of the ambulances. There must be an ample water supply.

Field hospitals, it must always be remembered, must advance with the divisions to which they are attached; during the active operations of the troops they are intended merely for the temporary accommodation of the wounded immediately after a battle. A constant stream of convoys of sick and wounded must, therefore, be kept up from them toward the stationary hospitals on the lines of communication and the base. When an engagement is imminent, the field hospitals must be emptied, so as to be ready to move forward and receive the wounded from the battle field; and when this is impossible in the case of any particular hospital, in consequence of the serious nature of the cases occupying it, it must be left



Speed, 19 Knots. MARBLEHEAD (Unarmored Cruiser). Cost, $674,000.

behind to become itself a hospital on the lines of communication and an empty hospital sent forward to take its place.

During and immediately after a great battle the press work in a field hospital is usually very great. Large numbers of wounded men requiring immediate attention arrive almost simultaneously. Food must be given to them, many primary operations must be performed, fractures must be got into position and rendered immovable, wounds must be rendered aseptic and dressed—in a word, all the surgical necessities of perhaps a hundred men, some of them slightly and some of them terribly injured, will require instant consideration and treatment. These are not in modern times procedures which can be hurriedly performed, nor in a perfunctory manner; on the contrary, they require, to achieve the successful results obtained by scientific surgery, almost the same nicety of manipulation and care in detail which the bacteriologist expends on his experiments in the laboratory. Failure in the laboratory means only the waste of an experiment, but failure to keep infection from a wound or to render it harmless if it be present means pain and suffering from surgical infective diseases, loss of limbs, and in many cases, of life itself.

THE STATIONARY HOSPITAL.

The stationary hospitals on the lines of communication are more permanent and better equipped establishments than those just described. They are "dieted hospitals;" that is, the patients in them are fed, as closely as may be, according to the usual hospital diet scale. They are intended for the reception of 200 men, and stretchers, to be used as bedsteads, are supplied for this number. Patients can be treated in them until such time as they are sufficiently recovered to bear the journey toward the base of operations without risk. They should be established in buildings if possible, but if none are available, tents are supplied.

The number of these hospitals which will be required on any particular campaign depends naturally on the distance the troops advance into the country; on, in fact, the length of the

lines of communication and on the character of the roads and means of transport from the front to the base. If a railway be available, if the roads be good, or if a waterway can be used, fewer of them will be necessary. In any case they should be placed as near to the lines on which the sick convoys travel as possible.

The third line of medical assistance in a campaign consists of the general hospital at the base and hospital ships.

The general hospitals at the base of operations are as fully equipped as the similar institutions at home, and they are administered on the same lines. They accommodate either 400 or 500 men. To each is attached a military depot. Patients are treated in them until sufficiently recovered to be discharged to the military depots, whence they are sent to rejoin their corps at the front, or if unlikely to be able to take any further part in the campaign, they are invalided for disposal as permanently unfit for service or for further treatment. As many of the hospitals as the number of sick and wounded coming from the front require are opened at the base.

Hospital ships are established at places where the situation of the base of operations renders it possible, and the circumstances of the campaign make it advisable that they should be employed. They are supplementary to the general hospitals at the base, and are as perfectly equipped as station hospitals at home. They accommodate 200 men, with additional spare cots for emergencies. In connection with them steamships are employed for taking bad cases home or elsewhere; these are specially fitted for the reception and treatment of sick and wounded men.

Two medical store depots are established in most campaigns; one at the base and one at the front near the most advanced stationary field hospital. The regimental medical officers, the bearer companies and the field hospitals replenish their supplies of drugs, surgical materials and instruments from the advanced medical store depot, and the latter is itself kept fully equipped from the one at the base, which receives its supplies direct from home.

All the nursing duties in the field hospitals are performed

by the men of the medical staff corps, while at the base hospitals and in the hospital ships, the ladies of the army nursing service are employed as well.

The above, although a mere sketch of the medical arrangements laid down by regulation, will supply a fairly accurate idea of the means which are employed in warfare for the care and treatment of the sick and wounded. The regulations of the medical services give concise instructions as to how everything should be done. But rules must be made to give way to circumstances and regulations cannot, and need not, be too rigidly adhered to when other methods of arrangement and distribution seem likely to produce better results.

CHAPTER XXVI.

THE MEN IN THE TURRET BEHIND THE GUNS.

HOW IT LOOKS INSIDE THE FORWARD TURRET BEHIND THE EIGHT-INCH GUNS—"LOAD!" "POINT!" "FIRE!" "SPONGE!" —THE WONDERFUL STORY OF THE EIGHT-INCH GUNS AT MANILA.

In the forward turret of Admiral Dewey's flagship Olympia, in the harbor of Manila, at dawn on Sunday morning, May 1, 1898, stood twelve Yankee gunners.

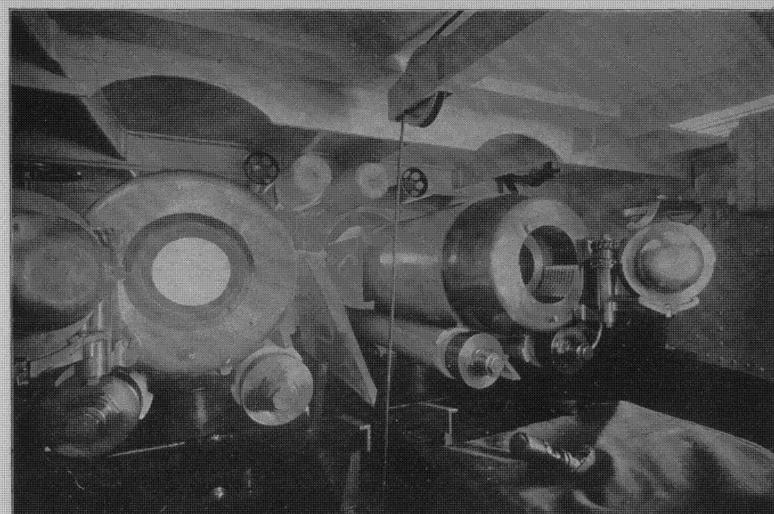
Twelve gallant Americans trained the two eight-inch guns, now upon this Spanish armor clad, now on that, and again on the forts at Cavite.

With the precision of a machine, the twelve men during that terrific hour and a-half's engagement bent to their work, loading, sighting, aiming and firing again and again. The roar of the guns and the crash of the enemy's shells on the steel walls of the turret did not interfere in the slightest with the business in hand, as with clock-like regularity they got those death-dealing eight-inch terrors into shape to tear a hole in a Spanish hull or break through a Cavite wall.

Like the awakening of some angry monster striving only to lay waste, the guns poured shot after shot from the revolving turret, and the twelve half-stripped men peered through the portholes as the steel projectiles of death screeched across Manila bay.

As an example of magnificent discipline and machine-like obedience to duty in the face of death, there is nothing to compare with the men behind the guns in a modern fight between ironclads, such as the historic battle of Manila bay.

When an ironclad like the Olympia goes into action the order comes sharp and barking: "Muster the crew." The gunners on the Olympia, twelve in each turret, six for each



Interior of the Upper Turrets Showing Breeches of the 8-Inch Guns on "MASSACHUSETTS."

gun, fall in position in response to their numbers, called out by the captain of each crew, and stand rigid and ready for whatever order may come.

Each man knows his place, knows what is expected of him, fully comprehends his responsibility, and, perhaps, his eyes sweep the deck in farewell. There are five chances in ten that he will enter the turret to die. But a death like that makes history. His passing will be under the flag, honorable and on duty, and he waits the next command.

At each gun there is a captain, a plugman, a loader, a sponger, a liftman and a shellman. Their separate duties are clearly defined. They have been drilled to fight, if necessary to die. If one of them drops at his post, another, without a murmur, takes his place. The twelve men in the turret are like so many automatons.

At the battle of Manila that forward turret on Admiral Dewey's flagship Olympia, smoking and gleaming with the glare of war, demolished the ironclads of Spain and sent them floundering and on fire into the sea.

It was the hour or retribution, the day for which the men in the turret had waited patiently. The order to "Muster the crew" came to these men like a benediction, and the reckoning with Spain was at hand.

"Two, three, four, five, six, seven, eight, nine, ten, eleven, twelve," sang out the turret captain, who is No. 1 of the crew, and in less than a minute the two guns of the Olympia's forward turret were manned.

"Silence," rang out the command through the still morning air, and the crew faced the guns voiceless and attentive.

For a second or two the men, stripped to the waist, stood mute, straining to catch the next order.

"Cast loose and provide," commanded the division officer, and in an instant the captains ot the gun crews on the starboard and port guns began a rapid inspection of the mechanism of the guns. Skilful fingers opened the breech, the loader and sponger hastened to see that the elevator gear for hoisting ammunition out of the magazines was clear; to cast off the lashings, place them amidships out of the way; to open the

ports, to see that the loading tray was in place, and to remove the wooden plug and the muzzle bag from the muzzle of the gun with a steel lanyard.

Each crew captain took the firing lock from its case, prepared it for use, placed the rear sights, removed the covers, saw that the priming wires and minor appliances were in place, provided himself with primers, closed the breech after the sponger had performed his duty and reported to the division officer that all was ready.

The plugman, loader, sponger, liftman and shellman arranged their materials for action and fixed the paraphernalia necessary for quick work in their appointed places. Sponges, tubs, swabs, cutlasses, revolvers and rifles were racked within reach, and the belts for smaller ammunition were hung at arms' length.

The instant the order to "cast loose and provide" was executed, each man returned to the position occupied when the order of "silence" was given.

The powder tank was brought up and the captain having inspected the fuse and the primer, all was ready for the order to "load." This order was instantly followed by No. 9 and 10, hauling up the projectile and placing it on the loading tray. No. 5 pushed it home, assisted if necessary by No. 6, while 9 and 10 went for another projectile. The powder charge was then taken from the tank, the cartride placed in the tray and shoved home by hand.

The gas check and screw lock were wiped off, and No. 2 closed the breech. The captain inserted the primer, hooked the lock lanyard first and then full cocked the lock.

"Point!" came the command from the division officer. The gunner's crew was in position and the great gun was ready to send its message of death at the enemy as soon as the muzzle was properly trained on the Spanish ship. The man at the sights had an excellent eye, good calculation and a cool head. On a fighting ship he may be one of the most obscure men on the ship, but his superior marksmanship is always recognized by every one. It is one of the most responsible positions in the ship, and if in the opinion of the captain an enlisted man is

a better pointer than an officer his services are brought into play at once.

At the order "Commence firing," the captain pulled the lock lanyard and the eight-inch gun vomited forth its thunderbolt of steel weighing 250 pounds.

It was with such cool and calculated deliberation, but far more quickly than is here described, that the shots began to pour from the turrets. Each of the eight-inch guns can discharge three shots a minute.

Meanwhile the smoke of battle began to curl from the port-holes and swirl skyward in the fighting tops, where the deadly Hotchkiss six-pounders sing the death song for a radius of two miles.

At Manila the forward turret of the Olympia blazed out its six shots a minute from the port and starboard guns, and the great ship rocking on the swell rose and fell as the skilful gunners fired eight-inch armor-piercing projectiles and shrapnel from the ports.

In the circular steel chamber the smoke and powder-laden atmosphere wrapped the men in mist, but the orders "Sponge!" "Load!" "Point!" rose in measured cadence above the din of battle, and the shafts of fire leaped screaming at the Spanish fleet, surging a thunderous farewell that crashed through the trembling ships of Queen Christina and blew their decks into showers of splintered wood and iron.

Slowly the flagship of the intrepid Dewey circled the harbor, while the forward turret continued its melting fire without interruption.

With each shot the great Olympia shook from stem to stern, while from the bridge Admiral Dewey looked down upon the men in the forward turret and gave his commands to the officers in ringing tones. He was directing a bombardment and a naval engagement that every tar on board had prayed for since the Maine sank to her death in Havana harbor.

For two hours the American fleet had poured its broadsides into the Spanish ships and Manila, and not a murmur came from the half-scorched, stifled gunners in the forward turret.

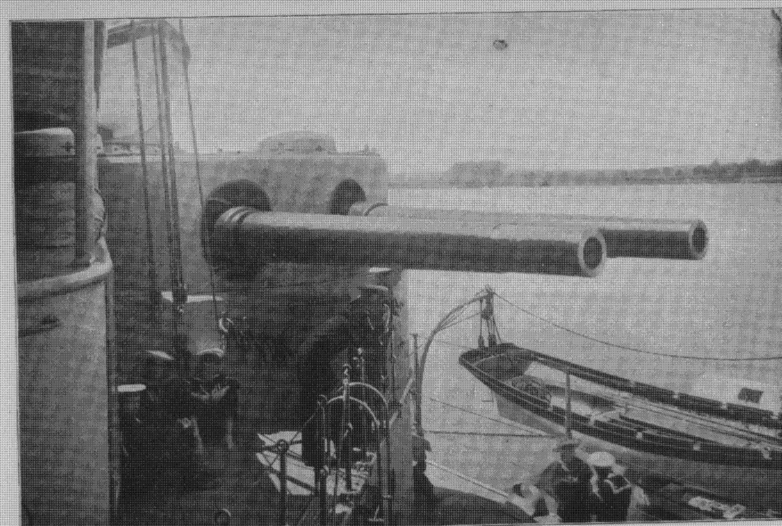
Ship after ship of the Spanish fleet halted in her fire, trem-

bled to the water's edge and then listed like a wounded whale before sinking. The black, smudged faces of the gunners peered through the turret openings at intervals and sought out the shattered cruisers and battleships that were lumbering helplessly in the trough of the sea.

At the end of an hour and a-half the firing from the ships of Castile grew visibly less, and fire and smoke rose from the decks of fighting machines that an hour before had swarmed with gesticulating, frenzied Spaniards, desperate at the chaotic scenes of blood and misery around them.

Protected cruisers that deserved a better fate blew up when the flames reached their magazines and went down in a hissing sea, scorching and blistering the men who sank with them.

At the end of two hours the order to "Cease firing!" was given by the division officer, and the twelve men in the forward turret of the Olympia at Manila that Sunday morning crawled out of their hell, and, leaning with their bare arms on the turret top, swept the scene of Spain's ruin from half-shut eyes. The sea had become calm again, and the waves curled and splashed over the hulks of a score of vessels that but a few hours before guarded the people and the capital of the Philippines.



UPPER TURRETS AND 8-INCH GUNS ON "MASSACHUSETTS."

CHAPTER XXVII.

CARRIER PIGEON SERVICE OF THE UNITED STATES NAVY.

In the present emergency, no more efficient corps has been placed at the service of the navy than the flights of carrier pigeons which are now at the disposal of Secretary Long. For two years the Naval Academy has been experimenting with carrier pigeons as messengers, with remarkable success, and now that there is need for the pigeons, it is found that the navy has at its disposal 500 of the fleetest little messengers ever placed at the call of a country.

The organization of a carrier pigeon service for use in time of war began with Professor Marion, of the Naval Academy. Lieutenant Harlow, U. S. N., also began active experiments with the birds some years ago, and to these two gentlemen is due the credit which now attaches itself to the pigeon service of the army.

An arrangement has been made by which the Lighthouse Board will co-operate with the Navy Department in establishing and maintaining a system of coast-line signal stations, including homing pigeon lofts and all the equipment, for communicating for long and short distances on the seaboard from Maine to the Pacific coast. Ships of the navy cruising within certain fixed distances may thus communicate with the shore and warn coast cities of approaching danger. The War Department has ordered 3000 carrier pigeons to be put in training at once. Philadelphia will furnish most of them.

What makes the homing pigeon so valuable as a carrier of messages is the fact that it combines a marvelous faculty of immediately getting its bearings, no matter how far it may be taken from home, with a physical development which enables it to cover great distances.

The pigeons may be depended on to cover distances of fully

200 miles air line with great speed. From very great distances, 500 miles or more, the birds are at a great disadvantage, inasmuch as they are forced to forage for themselves, which they are not trained to do.

There are birds in this country that have homed from 614 miles air line the day they start, making an average speed of 1309 yards per minute. There are also a few pigeons in the United States that have covered more than 1000 miles, the extreme distance covered being 1212 miles.

With a well-equipped pigeon service in time of war, a government conducting war upon its own territory or upon a territory not too far removed, is independent of telegraph and telephone systems, and can at comparatively little cost maintain regular communication with its land and water forces.

Messages carried by the Navy Department pigeons are written on the thinnest rice paper, incased in a tiny aluminum holder, capsule shape, fastened to the bird's leg. Professor Marion, of the Annapolis Naval Academy, is the inventor of this message-holder, which is water-tight and weighs only eight grains.

Pigeons used in carrying dispatches upon the ocean are trained up and down the coast for about 100 miles each way from home. Training on the coast has a double purpose—accustoming the birds to their baskets and getting them used to being tossed, as well as making them familiar with the coast. When birds are liberated at sea, upon sighting land they will start for it at once, striking the shore at the nearest point. Having once reached land, they will proceed home by the nearest overland route.

One of the most remarkable incidents illustrating the memory of a homing pigeon was that of a bird captured during the Franco-Prussian War, which, after being kept in confinement for ten years, immediately returned to its home upon being set free.

A pigeon imported from a loft in Belgium by a New Jersey fancier was recently set at liberty. Two days later the bird was picked up at sea between 400 and 500 miles from the coast.

The latitude and longitude were noted, and showed the pigeon to be upon the right course for home in Belgium.

For two years the most active training has been going on, and a cote at Key West was established and Lieutenant Harlow was placed in command of it. As soon as active hostilities broke out between this country and Spain the Navy Department made inquiries about the pigeon service and found that a large number of rapid, accurate pigeons could be placed at its disposal. The birds were taken to Key West, which is only ninety miles from Havana, and located in Lieutenant Harlow's cote there. They have been taken out from this cote to sea and released time and again within the last few weeks, and always with the greatest success. Scarcely ever has a pigeon failed to return to its home.

In the torpedo flotilla which is now being equipped to match Spain's flotilla, there have been measures provided on every boat for the accommodation of the carrier pigeon. When the flotilla starts out it will take with it many of these winged messengers.

The value of the pigeons in time of blockade is great, as the Naval Department can be notified of the blockade and can send ships to the relief of those in distress. A scout boat in the Gulf with a pigeon service is even of more value. The scout ship can communicate with the Navy Department within an almost incredible space of time, and the navy can thus be kept in constant acquaintance with the movements of the enemy.

When the Spanish torpedo flotilla of hornets set sail from the Canary Isles in May, 1898, the news was made known to the Navy Department by means of the carrier pigeon "Swift," which was released from the scout boat, lying off the Canary Isles. At the same time the news was cabled to Madrid, to Key West and to Washington, but the first intelligence was received through the pigeon.

So highly does France estimate the value of pigeons in case of war, that it recently passed a law that homing pigeons from other countries should not be admitted to France except under the strictest conditions. The French army and navy authorities realize that in case of war these pigeons could be released

and could carry to the opposing country correct news of the doings in France. It will therefore not allow any trained foreign pigeons to become residents of France.

The instinct of the homing pigeon is always for home. You may take it away and keep it for six months, yet on its release it will fly up into the air, circle round and round for a moment, then dart in the direction of its own home. That is instinct.

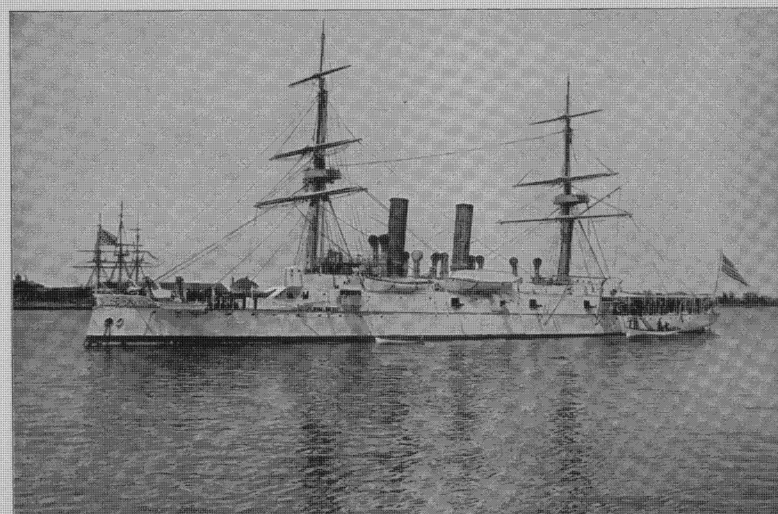
Scientists claim that there is nothing wonderful in the instinct of the homing pigeon. They say that the pigeon flies high enough to get a view of the landscape, and that it has an eyesight which is phenomenally powerful in proportion to its size. When it reaches a sufficient height it takes in the situation, and, seeing its familiar shores in the distance, darts rapidly in that direction. In this way it can regain its home.

Should the pigeon at times be mistaken and fly slightly out of its course, it will alter its flight and reach its home unerringly if given the proper time.

Take the case of the Andree pigeon which made a long trip from the balloon. It was shot while resting on a vessel. The bird had traveled 120 miles from Andree's balloon toward Stockholm, then seeing no land, had turned and came twenty-four miles north again. Naturally exhausted, it sank to rest upon the staff of a vessel and was so tired that it put its head under its wing. Fearing that it would fly if disturbed, a sailor shot the bird, took it up out of the water and read the message under its wing. The fancier who trained the bird said that it flew twenty-four miles to rest on the vessel, but after resting it would have retraced its course toward Stockholm.

In the regular pigeon stations connected with the army and government there are provisions made for the reception of the pigeons. A homing pigeon may arrive home at night or day. When released it makes a flight for its home, and rests only in the darkest hours. In one of the stations there is a mechanism by which a bird may fly in, but after once in it is a captive. A bell rings in the captain's office telling him of the return of the messenger. These stations are now at Portsmouth, N. H., Key West, Fla., and Mare Island, Cal.

The hardships which these birds will unflinchingly face in



Speed, 15½ Knots. ATLANTA (Protected Cruiser). Cost, $617,000.

returning to their homes can hardly be appreciated by those not familiar with their characteristics. Cases are cited where birds so badly shot or torn by hawks as to be rendered almost helpless have struggled on until home was reached.

General Miles and Admiral Sampson at their headquarters, ashore or afloat, with a basket of well-trained homing pigeons belonging to a government coop at Key West, would be perfectly independent of the cable as a means of quick communication with Washington.

CHAPTER XXVIII.

OLD-TIME CANNON AND NEW.

RECENT MARVELOUS DEVELOPMENT OF NAVAL ARMAMENTS—FIRST USE OF CANNON IN WAR—SUBSTITUTION OF IRON AND STEEL PROJECTILES FOR STONE SHOT—INTRODUCTION OF SIGHTS AND RIFLING—HOW MODERN RIFLED CANNON ARE CONSTRUCTED—METHOD OF SECURELY MOUNTING THEM ON SHIPBOARD—SUPERIORITY IN RANGE, ACCURACY AND PENETRATION OF MODERN GUNS OVER OLD SMOOTH-BORES—SOME INTERESTING COMPARISONS.

Cannon were used for the first time in war probably at the siege of Quesnoy, France, in 1340. At the siege of Calais, in 1347, Edward III, of England, is known to have used cannon, but how different these cannon were from the modern, high-powered gun of the present day may be appreciated when it is said that three or four ounces constituted the daily allowance of powder then, and the supply of projectiles consisted of 204 lead shot and twelve small pieces of lead for a battery of twenty cannon! Toward the close of the fourteenth century cannon came into use at sea. At first only galleys were armed with them, but a little later sailing vessels were equipped with "bombards," cannon of small caliber, mounted on deck and firing stone shot over the rails. In the year 1350, in a sea fight, the Moors of Seville used cannon against the Moors of Tunis, and in 1387, for the first time, the English and French fought at sea with guns.

Early in the fifteenth century gun ports were invented, and soon the sides of ships began to bristle with cannon. From specimens which are still in existence we learn that these early cannon were either built up of wrought iron or cast in brass. They were not infrequently of immense size and length, and

even in those crude times a breech-loading system was in vogue. And in those days cannon makers recognized the fact that the great strain came on the breech, for in a cannon of the reign of Henry VI of England a bronze cylinder was inserted in the breech of a wrought-iron gun to strengthen the chamber.

The cannon of Mahomet II, which were used in reducing the Byzantine city, now known as Constantinople, were constructed in 1453, were of cast brass and hurled a stone projectile over 600 pounds in weight. The historian, Gibbon, is responsible for the statement that "by using the utmost expedition this great cannon could be loaded and fired no more than seven times a day." It would seem that these cannon, which were used in the siege of Constantinople, were of about the same size as our modern 10-inch guns, though they did not, of course, possess anything like the accuracy, range or penetration. Yet even larger cannon than these, cannon firing stone balls of 1100 pounds weight, are still to be seen by travelers on the coast of the Dardanelles.

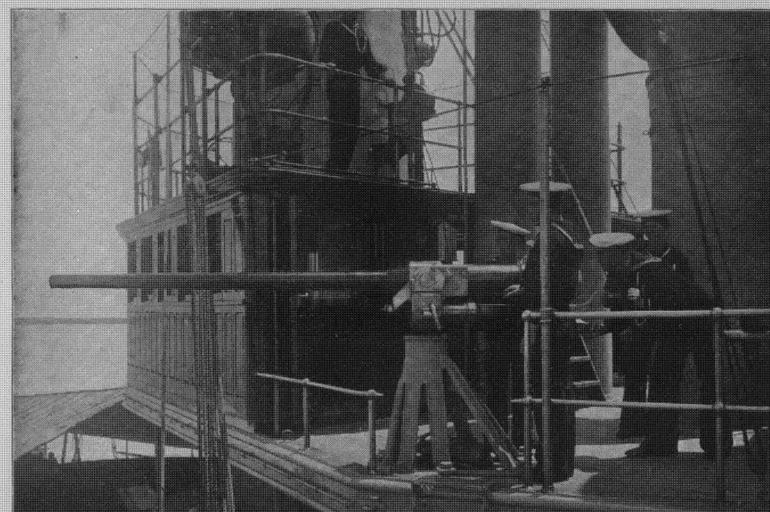
The wrought-iron cannon in Edinburgh Castle was used at the siege of Dumbarton Castle in 1489, and was fired as late as 1682. It has a caliber of twenty inches, yet fired a granite shot weighing only 330 pounds. Such a projectile in these days could be hurled easily by an eight-inch rifle. But we use 150 pounds of the very best powder to send such a missile on its mission of death, while the powder used in those old days was far inferior and the charge probably about one-tenth the weight of that employed today. The old warriors appreciated the fact that the greater the length of the gun the greater the penetration.

Some of the cannon exceeded in length the very latest guns of the present day. This fact is clearly demonstrated by a cannon which can still be seen in Dover Castle. It has a bore of four and three-quarter inches, fired a projectile weighing only twelve pounds, and yet was fifty-three calibers in length, thus far exceeding in length the Armstrong gun, much used in the British Navy, which is one of the longest guns afloat today in comparison to the size of the bore.

Iron shot came into use about the year 1450, although stone shot continued to be used for a long time after that. About 1550 cast iron came into use almost exclusively for guns, and they were made entirely of this material for 300 years, for it made the construction of guns more simple, rapid and cheap. It is pretty certain that rifling, too, came into use about the middle of the sixteenth century, for at the Woolwich Arsenal in London may be seen a barrel on which is stamped the date of 1547. This barrel is rifled with six grooves, which have a considerable twist, and is, moreover, fitted with a breech-loading mechanism. Thus it is seen that it has taken more than 300 years to develop the two principal ideas on which are based the two great features of modern ordnance—breech-loading and rifling.

In the seventeenth century no great progress seems to have been made in ordnance, although the number and weight of the guns carried by individual ships were increased. Since victory on sea as well as on land was gained by bringing to bear on the point attacked a sufficiently powerful force to crush the enemy at that point, the advantage of vessels with great individual artillery power soon became evident, and this power was sought by the greatest possible increase in the number of guns carried. In 1737 the first English three-decker, the Royal Sovereign, was built, carrying the tremendous battery of 150 guns. Early in the eighteenth century a method of boring guns instead of casting them solid came into use. This added very much to the efficiency of the gun. Still, solid spherical shot continued to be used, although the advantages to be gained by the use of elongated projectiles was pointed out by Robins, who, about the middle of the eighteenth century, published a treatise on gunnery. A century elapsed before the principles which he had laid down were put into practice.

Up to very recently the guns used by the chief naval powers of the world were smooth-bore and sightless. The records in shooting which American gunners made during the war of 1812 with Great Britain are remarkable when we consider the difficulties under which the gunners worked. Then the gun



6-POUNDER ON UPPER WORKS OF "MASSACHUSETTS."

had to be hauled in and out by a dozen men with the aid of tackles. To train right or left it had to be hauled or worked around with ropes and iron bars, while to obtain elevation or depression of the muzzle wedges were withdraw from or inserted under the breech. The slow match for firing had just been superseded by the flint lock, which was considered a great improvement, and was invented by Sir Charles Douglas in 1782. Sighting was done by what is called the "line of metal;" that is, running the eye along the exterior of the gun and making allowance for the inclination of this line to the axis of the bore, due to less thickness of metal at the muzzle than at the breech.

Fixed sights came into use about the beginning of this century. It seems strange that their advantages were not appreciated by the fighters of that time, but that they were not is amply proved by the opposition which this innovation met with. In 1801 a proposal to use sights on guns in the navy was sent to Lord Nelson. His opinion was unfavorable, as may be gathered from the following reply which he made to the Admiralty:

"As for the plan for pointing a gun truer than we do at present, if the person comes, I shall, of course, be glad to look at it, or be happy, if necessary, to use it, but I hope we shall be able, as usual to get so close to our enemies that our shot cannot miss the object if we want them to."

Nelson wanted to be right up close to the enemy, where every shot could be made to tell. A three-mile range would have astounded him.

The claim to the distinction of having devised and introduced the shell system of projectiles is conceded by every one familiar with the subject to belong to General Paixhans. The rifled guns were first used in service during the Crimean War on the allied ships of France and England. At first, of course, they were very crude in design and faulty in construction, but even with these drawbacks they showed so many points of superiority over the smooth-bore guns of equal weight that their development was rapid. In England the Lancaster gun came into use. It was made of cast iron, and had an elliptical

bore which was twisted so as to give a projectile of the same shape the necessary spin to keep it end on. A great deal was expected of these guns, but the projectiles frequently jammed in the bore, sometimes breaking up and sometimes even bursting the gun with fatal results, and they were abandoned after a long trial. The trial, however, was valuable, in that it pointed the way to better things.

Sir Joseph Whitworth about this time invented his well-known gun, with the hexagonal twisted bore. The Armstrong gun, however, was generally considered the best, and was finally adopted by the British Government. It was built up of wrought-iron tubes, with wrought-iron hoops shrunk over them. It was a breech-loading weapon, firing iron projectiles coated with lead. Between the years 1859 and 1863 more than 3500 Armstrong guns of calibers ranging from two and one-half to seven inches were manufactured, but the gun was defective in many ways, so that in a few years they were all abandoned and guns built up in the same way, but muzzle-loading, were adopted in their place.

This was a retrogressive step, which was not retraced till fifteen years after. Just about this time in our own country the smooth-bore shell gun attained such a development through the genius of Dahlgren and Rodman that the general use of rifled cannon was postponed for many years. For a long time the 9, 11 and 15-inch Dahlgrens were superior to any previous smooth-bores, and equal even to contemporary rifled guns. Their superiority was due as much to a better distribution of the metal to withstand firing strains as to the superior quality of American cast iron. From the time of the Civil War up to 1882 there were no improvements from smooth-bore gun to rifle in our naval armament.

The modern naval gun is a breech-loading weapon. It consists of an inner tube of the finest grade of forged steel, over which are shrunk reinforcing jackets and hoops of the same material. The breech is usually closed by means of a slotted screw system, by which a powerful screw thread on the breech block engages with a similar thread forged on the inner surface of the outer jacket covering the breech. The chamber,

instead of being smaller in diameter than the rest of the bore, as it used to be, is now larger, so as to permit the employment of very large powder charges without unduly shortening the travel of the projectile before it leaves the muzzle of the gun, thus giving to it the advantage of every ounce of pressure which the combustion of the powder generates.

In guns of earlier makes the projectile left the muzzle before the gases impelling it had fully expanded, and thus, by too short a gun, much of the energy of the powder was wasted. The shortness of the bore in old ordnance was, however, to some extent compensated by the use of a quick-burning powder, whereas that now employed is slow-burning and takes much longer to develop its highest pressure.

The length of the modern gun is generally thirty calibers, sometimes a little more. The rifling consists of a large number of shallow grooves with a twist, increasing as they approach the muzzle. The rotation of the projectile, necessary to keep it point on while traveling through the air, is imparted to it by a copper band fastened round it near the base. This band is of a diameter slightly greater than the caliber, so that it is forced into the grooves as the projectile moves forward.

There are three kinds of projectiles. The common shell, made either of steel or cast iron, and containing a large bursting charge; the armor-piercing shell of forged steel, with a finely-tempered point for penetrating armor, and containing a quantity of very high explosive, such as jovite, and the shrapnel, containing a great number of small balls, with a bursting charge to spread them when the fuse acts. These projectiles weigh in pounds about one-half the cube of their diameter in inches. Compared with the solid shot of the smooth-bore, they are four times as heavy, and they are fitted with percussion fuses, exploding them on impact, or with time fuses which can be set to explode them after a given period of flight. The powder charges are about one-half the weight of the projectiles and impart to them a velocity of 2000 foot-seconds.

There are now coming into use in the United States Navy smokeless powders, with charges of which, weighing from one-fourth to one-third the projectile, muzzle velocities as high

as 2600 to 2700 feet a second are obtained. But the erosion of chamber and rifling, due both to the chemical action of the gases which this new powder generates and to the enormous pressures developed by it, is so great as to raise a very reasonable doubt, not only of the superiority of the smokeless powder over that which is slow-burning, but of its utilty under most circumstances. This so-called smokeless powder has for its base a high explosive, such as gun cotton or nitro-glycerine, or a mixture of both, and the rapidity of its combustion is overcome by using it in a dense, non-fibrous form or by the addition of inert substances.

The calibers of the new rifles with which our ships are armed are 4, 5, 6, 8, 10, 12 and 13-inch. The processes of construction and the methods of assembling the various parts are the same for all these guns. The starting point in the manufacture of a big rifle is an immense vat of molten steel of the finest quality obtainable. While cooling, yet still in a malleable condition, the whole mass is put under powerful trip-hammers which work and beat it to prevent any air being inclosed between the cooling particles, a possibility to be carefully guarded against, since the imprisoned air would prevent a thorough kneeding of the steel and might develop weakness and render the tube less able to withstand the tremendous pressure which firing exerts upon it.

After this forging process the piece is rough-bored and turned down in huge lathes nearly to service dimensions, but enough metal is left on one or both ends to permit ot taking off test specimens. This rough-bored and turned forging is then annealed and oil-tempered, and then the test ends are cut off and put to the trial. If these tests come up to the requirements in tensile strength, elastic limit, and elongation, the forging is accepted. This forging comprises the inner tube of the gun, which is rifled. Then jackets and hoops are forged in the same way. The jackets are made slightly smaller than the inner tube, but when raised to a white heat they expand sufficiently to permit of their being slipped on over the tube which they reinforce. In cooling these jackets shrink so that they bind and tremendously strengthen the tube. The assem-

Speed, 12 Knots. PETREL (Gun Boat). Cost, $247,000

bled tube and jacket are then placed in a lathe and turned to the proper diameter for the hoops, which go on over all by the same process of shrinkage by heat.

The gun is then finish-bored, the chamber is bored out, and the exterior is finished off. Finally the gun is rifled, the breech mechanism is fitted, the gun is sighted, and after firing on the proving ground under the most severe tests, it is ready to be issued for service. The calculated elastic strength of the guns ranges from sixten to twenty-five tons, although pressures as high as thirty tons to the square inch of chamber have been recorded at powder tests, without any enlargement of the weapon having been observed. For service use, however, the minimum pressure is thirteen and the maximum seventeen tons to the inch, and powder is made to obtain pressure within these extremes.

The 10, 12 and 13-inch rifles are only mounted on armored ships capable of great resistance to the heavy fire of an enemy, and then are always protected by turrets or barbettes. The 13-inch gun weighs about sixty-five tons. It fires a projectile weighing 1100 pounds with a muzzle velocity of 2100 foot-seconds, which is equivalent to the perforation, at the muzzle, of twenty-six and one-half inches of armor. The muzzle energy of the projectile, that is, the force given to it by the combustion of the powder as it leaves the muzzle, is 33,000 foot-tons, or sufficient to lift a first-class battleship three feet. The 12-inch gun weighs nearly fifty tons, and fires a projectile of 850 pounds with a charge of 450 pounds of brown prismatic powder. The 10-inch gun weighs only twenty-five tons, and fires a projectile of 500 pounds with a charge of 250 pounds of powder. The range of these big rifles is about ten miles. A range of a mile is considered point blank.

The mounting for these heavy guns is the same for all three, and is really very simple, when their tremendous weight is taken into consideration. To a saddle almost immediately beneath the trunnions the gun is secured by heavy steel straps. This saddle works on a slide supported by girders fixed to the turret floor. The forward part of this saddle is connected with a piston rod working in a steel cylinder. This cylinder

is cut with shallow grooves of varying width, their sectional area decreasing to nothing at the rear end, and is filled with water or glycerine. When the gun is fired it forces the saddle back. This thrusts back the piston rod in the cylinder, and the water is forced through the shallow grooves, thus absorbing the recoil energy and stopping the gun after it has traveled back about four calibers. A pipe conveys water from below to the cylinders through an automatic valve, which closes when the pressure in the recoil cylinder exceeds the working pressure in the hydraulic system.

Consequently, when the gun recoils the pressure of this system is exceeded by the pressure of the gun, and the valve closes. But when the recoil is checked, the gun pressure rapidly decreases, the valve connecting with the water system below opens, and water at a pressure of 600 pounds to the square inch is injected, forcing the gun back in battery. Two spring valves at the front end of the cylinder open during recoil to let out the water displaced from the rear to the front of the piston when the gun was fired.

For loading, the breech of the gun is depressed to a fixed loading position, a three-storied ammunition car carrying the shell in the upper compartment and half the charge in each of the others (for the charge is put up in two separate parts, being too heavy to handle in one) is hoisted in line with the breech by hydraulic power and the three parts of the ammunition are successively pushed home by means of a hydraulic rammer. For rotating the turrets steam or hydraulic power must be used, for the revolving weight, when a pair of heavy guns are mounted behind armor of reasonable thickness, is so great as practically to preclude the possibility of training by hand, except, perhaps, when the deck is perfectly level, and friction is thus reduced to a minimum. It is, therefore, regarded as indisputable that hand training gear is useless with turrets and with guns over eight inches in caliber. And it is not difficult to arrive at this conclusion when it is borne in mind that turrets like those carried by the Monterey weigh 180 tons, those of the Terror 280 tons, while the pair of 13-inch rifles with their turrets on the Indiana weigh 500 tons.

The eight-inch gun is the heaviest mounted on our unarmored ships, and it also forms the main battery of some of our battleships. It is thirty-five calibers long, weighs thirteen tons, and with a charge of 150 pounds of powder fires a projectile weighing 250 pounds. The six-inch gun is used for the main batteries of most of our cruisers, and also supplements the 13 and eight-inch guns on such battleships as the Indiana, Massachusetts and Oregon. It weighs five tons and uses a charge of fifty pounds of powder to hurl a 100-pound projectile.

For rapid-fire guns the ammunition is in one piece, and is called "fixed ammunition," in contradistinction to the ammunition for the larger guns, where powder and projectile are separate. For five-inch rifles the weight of a cartridge, containing powder and shell, is about ninety-five pounds. The cartridge resembles on a large scale an ordinary revolver cartridge, and is placed in the chamber by one man. When fired the gases act on the cartridge shell and do not, of course, corrode the chamber, thus rendering sponging unnecessary and thereby saving a great deal of time. By using fixed ammunition about five rounds a minute can be fired without much effort. The reason this quick-firing principle is not applied to larger guns is that a cartridge containing powder and shot in one piece for any rifle over five inches in caliber would be too heavy for one man to handle conveniently, and the employment of two men for loading, by interfering with the operations of other members of the gun crew, such as closing the breech, training, elevating and sighting, would prevent the rapidity of fire which it is the object of fixed ammunition to get.

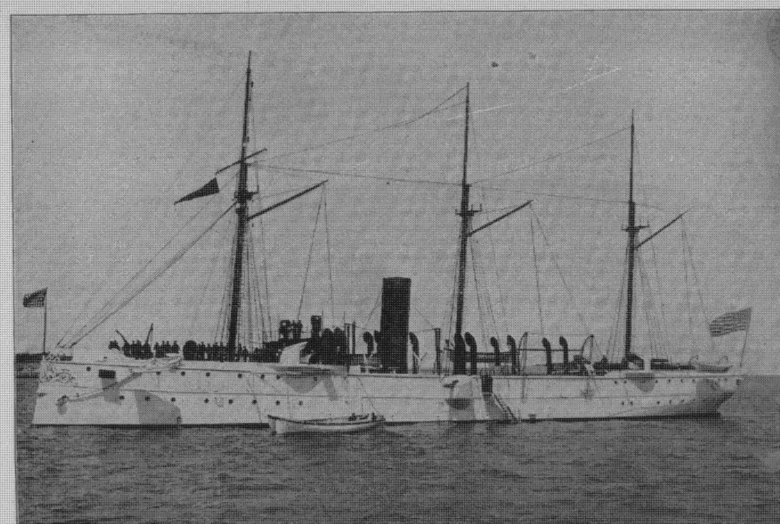
The five-inch gun weighs 7000 pounds, the projectile weighs sixty, and the powder thirty pounds. The four-inch gun is also rapid-firing. It weighs 3400 pounds, fires a projectile of thirty-three pounds with fifteen pounds of powder. Such is the tremendous rapidity of fire which can be obtained by the dexterous use of these guns that on the proving grounds the five-inch fired five rounds in twenty-four seconds and the four-inch five rounds in seventeen seconds. This is a remarkable record, but a record under the most favoring conditions. Good service in action would be four or five rounds a minute.

There is a three-inch field gun which is in use, but it really comes under the head of an army gun, and may therefore be dismissed from discussion here.

Then come the machine guns, which play an important part in naval engagements. The caliber of the new machine guns is the same as that adopted for the new small arm—the Lee rifle, viz., .236 of an inch. The muzzle velocity obtained from these guns is over 2500 foot-seconds, and their steel-covered bullets will pierce half an inch of mild steel or twenty inches of oak at moderate range.

While the weapons of modern ordnance have improved tremendously in recent years in range, accuracy of fire and penetration, yet the number carried by a modern battleship is very slightly less than the number carried by an old ship of the line. The necessity of carrying very heavy guns for piercing the armor of an enemy has resulted in placing but four of these guns on a ship. But the secondary battery must be taken into account, and it will be found that the usual battery of a first-class battleship has from forty-five to sixty guns. Thus, the Indiana, the Massachusetts, and the Oregon each carry four 13-inch, eight eight-inch, four six-inch, twenty six-pounders, six one-pounders, and four machine guns, or forty-six guns in all, throwing 6000 pounds of metal at each discharge with a total muzzle energy of over 200,000 foot-tons, a force capable of lifting the battleship herself twenty feet in the air if applied in the right direction and to the best lifting instead of to the best destructive advantage.

Just what is the most advantageous armament for ships of different tonnage and varied protection to carry can only be told by the practical test of war.



Speed, 17½ Knots. BENNINGTON (Gun Boat). Cost, $400,000.

CHAPTER XXIX.

SIGNALS IN SEA FIGHTS.

MEANS OF COMMUNICATION USED BY OUR WARSHIPS—FLAGS IN THE DAYTIME AND ELECTRIC LIGHTS AT NIGHT USED CHIEFLY—THE SECRETS OF THE SIGNAL BOOKS GUARDED CLOSELY—THE ARDOIS NIGHT SIGNALS AND THE MEYER WIGWAG SYSTEM.

In a naval battle, the success or failure of a fleet may depend on keeping open communication between the different vessels of the squadron engaged. Owing to the fact that the surface of the sea would often be obscured by the smoke of battle, the difficulty of this is apparent and naval experts have been kept busy devising some method by which the flagship can communicate with the other vessels of a squadron at all times and under all conditions. So far, nothing has been put in general service which meets this demand, but lately there have been experiments with a telephone which, it is said, can be used without wires, by which signals can be projected by a vibrator on one vessel against a receiver on another. The Navy Department is keeping the details of this new system carefully to itself, as it desires to have the invention for the exclusive use of our own ships in battle.

The present method of communication is by the use of flags representing numerals, which are displayed in the rigging; by the use of the Ardois system of lights for night work; by the Myer code of wigwag signals, and by the use of the heliograph. As it is of the utmost importance that the enemy should not read the message, the signal books on board a vessel are protected with the greatest care, and are destroyed along with the cipher code whenever it is seen that capture is inevitable. The semaphore system in use in the British Navy was tried for a

time aboard some of our vessels, but it never became popular, and has been abandoned.

In signalling by the navy code the sentence to be sent is looked up in the code book and its corresponding number is obtained. This number is never more than four figures, on account of the necessity of setting the signal with the least delay. The number having been obtained, the quartermaster in charge of the signal chest proceeds to bend the flags representing the numerals to the signal halyards, so as to read from the top down. These flags represent the numerals from 1 to 9 and 0, and there is a triangular pennant termed a repeater, which is used in a combination where one or more numerals recur. The numbers refer to those found in the general signal book, in which are printed all the words, phrases and sentences necessary to frame an order, make an inquiry, indicate a geographical position, or signal a compass course. Answering, interrogatory, preparatory, and geographical pennants form part of this code; also telegraph, danger, despatch and quarantine flags.

The signal, having been prepared, is hoisted and left flying until the vessel to which the message has been sent signifies that it is understood by hoisting what is called the answering pennant. If the number hoisted by the flagship is a preparatory order for a fleet movement it is left flying until all the vessels of the fleet have answered and then is pulled down, the act of pulling the signal down being understood as the command for the execution of the movement just communicated.

It is often necessary for a man-of-war to communicate with a merchant vessel or with some other warship belonging to a foreign country. For this purpose the international code is also carried in the signal chest. These signals are those in general use by all the merchant navies of the world for communication by day at sea. There are eighteen flags and a code pennant, corresponding to consonants of the alphabet, omitting X and Z. The code pennant is always used with these signals.

If a message is to be sent at night the Ardois system of night signals, with which all our vessels carrying an electric plant are fitted, is employed. These signals consist, essentially, of

five groups of double lamps, the two lamps in each group containing incandescent electric lamps, and showing white and red respectively. By the combination of these lights letters can be formed, and so letter by letter a word and thence an order can be spelled out for the guidance of the ships of a squadron. These lamps are suspended on a stay in the rigging, and are worked by a keyboard from the upper bridge.

On the smaller ships of the service, those which are not fitted with electric lighting, Very's night signals are used. This set includes the implements for firing and recharging the signals. The latter show as green and red stars on being projected from the pistols made for them. The combination of red and green in various ways is used to express the numbers from 1 to 9 and 0, so that the numbers, to four digits, contained in the signal books may be displayed.

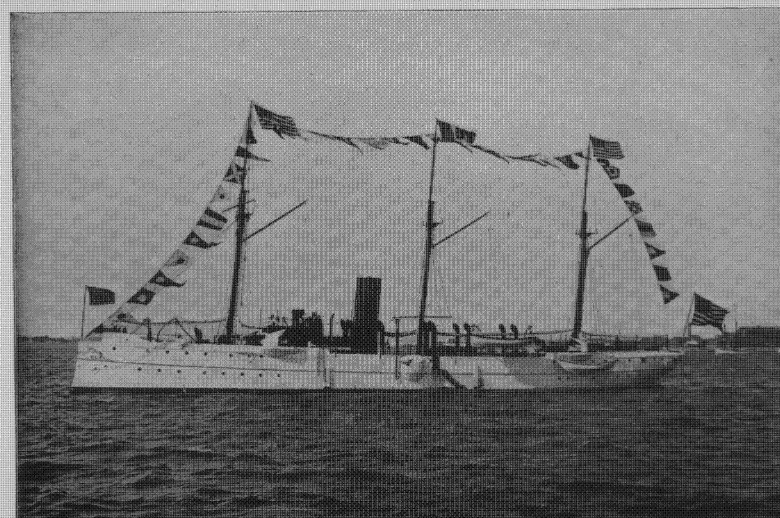
The Meyer wigwag system is employed either by day or by night. Flags and torches are employed. The official flag is a red field with a small white square in the center; the unofficial flag is the same with the colors reversed. The operator, having attracted the attention of the ship which is to be signalled by waving the flag or torch from right to left transmits his message by motions right, left and front, each motion representing an element of a letter of the alphabet, the letter being made up from one to four motions.

When circumstances permit, the heliograph is sometimes used. The rays of the sun are thrown by a system of mirrors to the point with which it is desired to communicate, and then interrupted by means of a shutter, making dots and dashes as used in the Morse telegraph code. This system is used only when operations ashore are going on, as the rolling of the ship would prevent the concentration of sun's rays.

The present systems of flag signalling are products of experience in the past, and are the natural growth of the cruder flag system in use in the War of 1812 and in the Civil War. There have been some changes in the construction of flags, and the scope of communication has been enlarged, but otherwise our forefathers talked at sea in much the same way that we do now. Of course, the Ardois light signal is something very modern.

In old times they communicated at night either with colored lights or by torches, but as there was no alphabetical code in those days the process was by means of flashes (representing numbers in the signal book), and it was long and tedious.

How well the present flag and wigwag signals will work during an engagement remains to be discovered; but if they fail, attempts can still be made to communicate by the ship's whistle or by written messages displayed on blackboards if occasion offers. In case of an enemy appearing on our coast, arrangements have been made to notify the nearest body of troops or the commander of whatever ships may be at hand. For this purpose towers have been erected at intervals, and telegraph wires leading from one to the other have been strung. This, together with the telephone system in use by the life-saving service, will permit of ample warning on the approach of a hostile squadron.



Speed, 17 Knots. CONCORD (Gun Boat). Cost, $490,000.

CHAPTER XXX.

TRAINING PACK MULES.

HOW THE PENSIVE HYBRID IS FITTED TO ACQUIT HIMSELF CREDITABLY IN WAR.

A government mule of long training has a reputation that is bad, but it is not to be compared to the contrary "green" mule. To one who did not understand the process of training it seemed that Tom Horn and his five assistants had simply driven sixty-three mules into a pen and were gently whipping them with ropes and lassoing them just for the fun of seeing them kick. But after three hours of disorder and discord, punctuated with brays, grunts and kicks, chaos finally ceased, and the mules stood in line almost as docile as so many sleepy kittens.

To understand the process of training, one must first know the routine duties that a pack mule in the army is required to perform. Each mule is branded with the letters "U. S." on the left shoulder. Each mule is given a number, and when in line he must stand in the place designated by that number. The number is branded in the bottom of the left fore hoof. Each morning and evening a long strip of canvas is spread on the ground and shelled corn or oats are placed on the canvas as the rations for the mule train. The trained pack mule must know his exact place in line before the canvas without any help from the men. Then when the men start to place the saddles and packs on the mules, the animals are supposed to stand stock still until ready for the march.

The "green" mules are receiving training which will eventually bring them under this perfect discipline. The government has just purchased another 1000 mules for the army, and they were branded at the National Stock Yards under the supervision of Capt. J. B. Aleshire, Assistant Quartermaster,

and 600 of them are now at Jefferson Barracks, under charge of Captain Von Schroder, Quartermaster, and Captain Knight, who is now Quartermaster of the post. The mules at the barracks are being trained for army pack service, and this work is being done under the direction of Frank Benham, master of transportation, who is an old-time freighter from the Western plains.

In the army service the pack mules are divided into trains, each train having sixty-three animals. With each train are one boss packer, one cargodore, and eleven packers, making thirteen men in all. One train, therefore, has fifty pack mules and thirteen riding mules. One cook and one blacksmith look after each train. The boss packer superintends the packing in general. The cargodore looks after the physical condition of the animals and adjusts and equalizes the loads they are to carry. He washes the sore backs with castile soap and hot water, and adjusts the saddles so that a sore back will cause as little pain as possible. The blacksmith examines the hoofs of the mules, and sees that they are kept in good condition. Contrary to general belief, an army mule receives much better treatment than most mules owned by civilians. The army mule is looked after almost as carefully as are the men. The short, chunky mule, about fourteen to fourteen and one-half hands high, is the best for pack purposes, especially in a mountainous country. However, a great many mules now at the barracks are fifteen hands high. They are a fine lot of animals, sleek and well fed, for which the government paid $94 a head. An army pack mule carries a load weighing from 250 to 300 pounds. Each train carries ammunition and rations for men and animals and cooking utensils. One pack may be made up of two boxes of ammunition and two sacks of oats or shelled corn, all weighing 250 pounds. Another pack may be composed of sides of bacon arranged in layers and thrown over the mule's back in saddle-bag fashion. Another pack may be made up of cooking utensils and flour, and another of bedding, etc. But each pack is adjusted so that it will weigh only from 250 to 300 pounds. It takes an experienced packer to adjust these packs by the weight quickly. A boss packer

receives $100 a month salary, a cargodore $75 a month, and a common packer $50 a month. The saddle used is known as the Tom Moore pack saddle. The name comes from the inventor, Tom Moore, an Irishman, who was master of transportation under General Cook during the latter's Indian campaigns in the West and Southwest. Moore is dead, and his military monument is his army pack saddle. It is a spring-bowed saddle, with soft cushions on each side, with two big pieces of leather running back to the crupper, and the saddle and pack are lashed to the animal by a broad canvas girth or cinch. Singular to say, the favorite pack saddle of the soldiers from the West is of Spanish make, and is called the "aperaro." Some mule trains have a gray mare, known as the "bell mare," which the cook rides. It is a well-known fact that mules will follow an old gray mare just like a flock of sheep will follow the bellwether. With a train of experienced mules and experienced men, the fifty pack animals can be saddled and packs adjusted and ready for a march within fifty minutes or one hour.

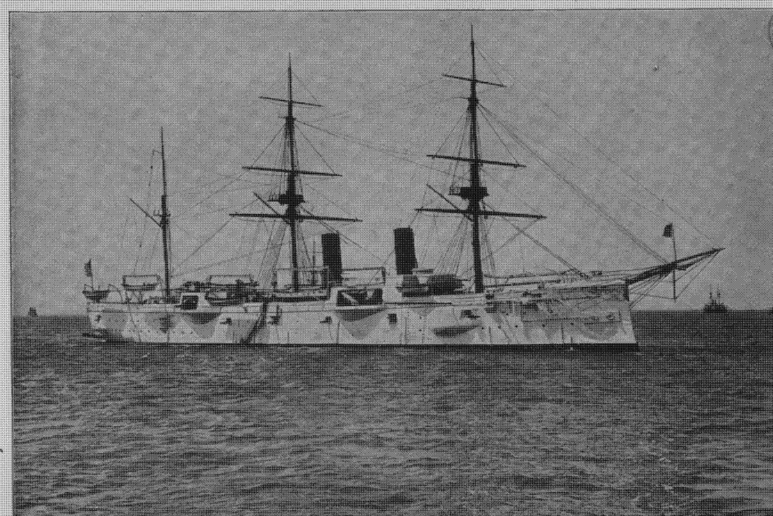
In the process of training at the barracks sixty-three mules, or one train, were placed in a corral at one time. Tom Horn, who will be the boss packer of what will be known as "Horn's train," not only superintended the training of the mules, but also of the men who intended to serve as packers. Only strong men physically are selected, as packing is one of the hardest and most tiresome duties in the army service. The mules, being unaccustomed to a strange place with strange ceremonies, ran from one end of the corral to the other and engaged in kicking matches. A particularly wild mule would invariably refuse to be led when a strap was fastened to his halter, and he would elevate his head and rear and plunge and pull backward, while the soldier would pull the other way at the other end of the strap. Thus would be seen a veritable tug-of-war between man and beast. One amusing spectacle was when a big bay mule lay back its ears, sent its hind feet into the air, and then ran from one end of the corral to the other, with a small, chunky soldier at the other end of the strap going over the ground at a hop, skip and jump. But the

plucky soldier held on to his end of the strap, and the mule jerked him hither and thither among all the kicking and excited mules in the corral. He appeared to be in imminent danger of losing his life, but he escaped unhurt. Finally the mule was conquered and saddled, and then the spectators applauded. After a saddle had been placed on a mule he was turned loose and allowed to go, so that he would become accustomed to his new paraphernalia. After an hour of this training the mules were caught and the saddles removed. Sometimes a contrary mule gave the packers a chase, but big Tom Horn only had fun by dexterously throwing a lasso and catching the mule by one leg, or throwing the noose over the nose, just as the notion seized him.

The most difficult lesson for the mules was in teaching them to form in line before a long strip of canvas to be fed. No rations are used in this training, but a long, straight row of saddles was covered with a strip of white canvas. Then Tom Horn and his men, using ropes for whips, drove the mules together toward the canvas-covered row of saddles. The mules kicked and cavorted, and often a half-dozen would break away and run, while those before the canvas would not stand still. Finally one mule after another was caught, and a strap fastened to the halter, and then led up with his head to the canvas. The halter straps were tied together.

This tedious process was continued for one hour, until all the sixty-three mules were tied together, their heads to the row of canvas. They appeared to be tied to one long strap in a way similar to a chain running from one hitching post to another. At first a few mules jumped over the row of saddles, but they were quickly made to jump back into their places. Within twenty minutes after all the mules had been thus tied they were standing in line quietly before the strip of canvas. Packer Horn said that every mule in the train would learn to stand in line before the canvas without being tied after a week or ten days' training, as the animals would then know that they would get something to eat when they stood at the canvas on the ground.

The manner in which Tom Horn managed these unruly



Speed, 15 Knots. CHICAGO (Protected Cruiser). Cost, $889,000.

mules proves that gentleness is far better than brutality even in the treatment of a stubborn mule. While a mule cannot be coaxed into doing something, and force must be used, yet Packer Horn used only gentleness and did not permit any of his assistants to yell angrily, much less use any brutality in whipping. When the mules were driven together they were only tapped lightly by the ropes in the hands of the men. Generally the men swung the ropes round and round over their heads and did not touch the mules, but simply drove them back quietly. When dealing with a stubborn mule Packer Horn never used a club or whip, but simply said, "Yuh! Yuh-h-h!" in a soft tone of voice. He even threw up his hands and exclaimed, "Shoo-o-o!" when several mules would try to run by him, and treated them as quietly as a woman driving a hen and chickens to the roost. Horn's method proves that even the much-despised and much-abused mule appreciates gentle treatment and is willing to obey a kind master. It is a well-known fact that a trained army pack mule is docile, as a rule. In some respects he has more sense than a horse. The first thing a horse does when he falls and becomes entangled during action or in an accident is to kick, but the mule lies perfectly quiet until released.

CHAPTER XXXI.

TYPES OF THE WARSHIPS.

DIFFERENCES IN ARMOR AND GUNS OF THE VARIOUS CLASSES—PRINCIPLE OF THE CLASSIFICATION—GENERAL PLAN OF THE FLOATING FORTRESS CALLED A BATTLESHIP—CHANGES THAT PRODUCE THE CRUISERS—THE TORPEDO-BOAT AND THE DESTROYER.

In these days of war talk there are a great many expressions in common use by persons who have no clear understanding of their meaning. This is especially true of naval affairs, the terminology of seamanship being always more or less confusing to a landsman. One constantly hears persons talking glibly about ironclads, cruisers, gunboats, battleships and monitors, without any distinct idea of the differences in the various types of vessels of which they speak so familiarly.

There are ten principal classes of vessels in the United States Navy, distinguished one from another by the differences in their use and by their strength and speed. The general principle underlying their construction is that a vessel which is not strong enough to fight one of her own size must be fast enough to run away. Any vessel which is inferior in armament and has no compensating superiority in speed is outclassed. The same is true of any vessel which is equal in armament but inferior in speed to an adversary.

The size of a vessel is measured by its displacement. This displacement is the number of tons of water she will push aside to make room for herself. A vessel of 10,000 tons will take engines of a certain weight and power to drive her at a given speed, and the larger the engines the larger the boilers and the greater the supply of coal required. Now, if it is necessary to give this vessel heavy protective armor and big guns,

the additional weight of this equipment must be saved somewhere else, and usually in the engine-room, reducing the speed of the vessel. Following out this principle, it will be found that the fastest ships carry the lightest armament, and that those which carry the biggest guns in their batteries and the thickest armor on their sides are comparatively slow, the extreme variation among vessels of the same displacement being about eight or nine miles an hour.

In the matter of attack and defence, vessels are distinguished by the number and weight of the guns they carry and by the distribution and thickness of their armor. Protective armor is of two kinds, that which surrounds the guns, so as to protect them from the enemy's fire, and that which protects the motive power of the ship, so as to prevent the engines from being rendered useless.

The maximum of guns and armor and the minimum of speed are to be found in the first-class battleship, which is simply a floating fortress, so constructed that she need never run away, but can stand up and fight as long as her gun turrets will revolve. The general plan of construction in a battleship is to surround the engines, boilers and magazines with a wall of Harveyized steel armor eighteen inches or so thick and seven or eight feet high, which extends about four feet below the water line and three feet above it. This armor belt is not only on the sides of the ship, but is carried across it fore and aft, immediately in front of and behind the space occupied by the engines and magazines, and the whole affair is covered with a solid steel roof, three or four inches thick. Outside this central fortress and extending from it clear to the bow and stern at each end is a protective deck of steel, three inches thick, which is placed several feet below the water line. Everything above this deck and outside this fortress might be shot away, and the vessel would still float and fight.

On the roof of the fortress are placed the turrets containing the big guns. The largest of these guns, 13-inch caliber, weigh about sixty tons each, and will carry a shell weighing 1100 pounds about twelve miles. The turrets are circular, as a rule large enough to hold two guns, and are made of face-

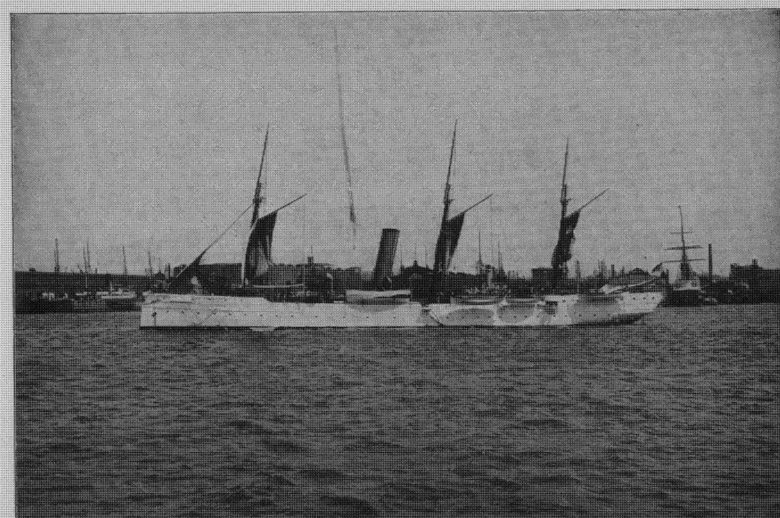
hardened steel from fifteen to eighteen inches thick. They revolve within a barbette or ring of steel eighteen inches thick, which protects the machinery by which the guns are trained. Further back on the roof of the fortress are other and lighter turrets, made of eight-inch steel and carrying eight-inch guns, and at other places are stationed rapid-fire guns of lighter caliber, protected by thinner armor than that in the main belt.

If all this secondary battery is stripped off, leaving nothing but the turrets with the big guns, and these are brought down close to the water, and the armor belt is reduced to seven or eight inches in thickness, the type of vessel known as the monitor is reached. It is simply a battleship on a reduced scale. Such vessels are very slow and cannot stand rough weather, on account of their low freeboard. The speed of monitors is seldom more than twelve or fourteen miles an hour, and they are intended to act in coast defence, usually in connection with shore batteries. The best types in the navy are the Terror and the Puritan.

The speed of a battleship is about eighteen miles an hour. The best specimen in the navy is the Indiana, declared by its admirers to be the most powerful battleship afloat.

Second-class battleships, like the Texas, are smaller vessels, usually about 7000 tons, and they have a much lighter armor belt, about twelve inches, and do not carry so heavy an armament as ships of the first class. The Maine was a second-class battleship. Her largest guns were of 10-inch caliber; her armor was twelve inches thick and her turrets were eight inches thick only.

The first step in reducing the armament from that of the battleship proper, at the same time increasing the speed, produces the armored cruiser. This type of vessel may carry no guns of more than eight-inch caliber, and the armor belt is reduced to three or four inches in thickness. Instead of the roof over the armor belt, the protective deck is carried all over the ship, but it is not flat, nor is it of equal thickness, as in a battleship. On the top and in the middle it is three inches thick, but the sides are six inches, and they slope abruptly to below the water line. Between these sloping sides and the



Speed, 15½ Knots. DOLPHIN (Special Class). Cost. $315,000.

thin armor belt coal is stored, so that a shell would have to penetrate the outer belt, six or eight feet of coal, and a sloping belt of steel six inches thick, the total resistance of which is calculated to be equal to a solid horizontal armor plate fifteen inches thick.

A cruiser is not supposed to fight with a battleship, because it could not accomplish anything with its eight-inch guns against the 18-inch armor of its heavier rival; while one well-directed shot from the 13-inch guns of a battleship or monitor would probably sink any armored cruiser afloat. For this reason the cruiser must be faster than the battleship, so that she can run away, and the weight that is saved in the armor belt and big guns is therefore put into the engine-room. The average speed of an armored cruiser is about twenty-four miles an hour, and the best types of this class in the navy are probably the Brooklyn and New York.

Some vessels, like the Spaniard Vizcaya, are about half-way between a battleship and a cruiser, having the heavy guns of the former and the speed of the latter. The Vizcaya, although a cruiser, carries 11-inch guns with a 12-inch armor belt, and has a speed of twenty-three miles an hour.

The next step in reducing armament and increasing speed produced the protected cruiser, which carries no armor belt, but retains the protective deck, upon the sloping sides of which is stored the coal. The turrets disappear altogether, and there is usually only one eight-inch gun, the battery being principally made up of four-inch rapid-fire guns and six, four and one-pounders. As this class of vessel is not able to cope with the armored cruiser, it must be faster, for the general principle holds good that the weaker the vessel becomes in point of offensive weapons or defensive armor, the greater the necessity that she should be able to run away. The best types of the protected cruiser in the navy may be found in the Columbia and Minneapolis, which have a speed of about twenty-seven miles an hour.

The weakest class of all is composed of the unprotected cruisers, which have neither armor belt nor protective deck, and carry only light batteries of rapid-fire guns. When these

vessels are slow, like the Detroit, they are intended for long voyages and for duty in foreign countries, and are of little use in a sea fight. The very fast unprotected cruisers, like the American line steamers St. Paul and St. Louis, attach little importance to their armament and rely for protection upon stowing the coal behind the place occupied by the armor belt in other vessels. All the beautiful wood work which was so much admired in these vessels has been ripped out to make room for these coal bunkers, which are sufficient to protect them from anything but the heaviest guns. On account of their extreme weakness as fighters, these cruisers are necessarily the fastest of all the large vessels, and can run away from anything. For this reason no concern was felt for the Paris by those who know the principles which govern the safety of modern vessels.

The various types of cruiser are not expected to fight with any but vessels of their own class, which they may encounter in the discharge of similar duties, such as scouring the seas as the advance guards of the slower line of battleships, preying upon or escorting merchant vessels, blockading ports, and acting as convoys for troop ships. Gunboats are simply light-draught cruisers, and are intended for use in shallow waters and rivers.

Torpedo-boats, as their name implies, depend entirely upon the torpedo as a weapon of attack, and they carry no guns except a few very light caliber rapid-firers to keep off small boats. Their success depends on their ability to approach a vessel very rapidly, launch their torpedo and retreat before they are detected and sunk. Speed is their great requisite, and a torpedo-boat like the Porter can steam thirty-two miles an hour. Naval experts consider their bark worse than their bite, because with the modern system of lookouts and searchlights, and the accuracy and rapidity of the secondary batteries, it is impossible for a torpedo-boat to get within range without exposing itself to instant destruction, and after a torpedo fleet has once met with a serious repulse, it is believed that it would be almost impossible to get the crews to go into action again.

The torpedo-boat destroyer, contrary to general belief, does

not carry any heavy guns, but depends on its great speed and its ability to cripple a torpedo-boat with its six-pounders while keeping out of range of the enemy's tubes. All torpedo-boat destroyers carry torpedo tubes themselves, so that they can be used against the enemy's battleships or cruisers if the occasion offers. The fastest boat in the navy is the destroyer Bailey, which can steam thirty-four miles an hour.

CHAPTER XXXII.

WHAT IT MEANS TO FIRE AN EIGHT-INCH GUN.

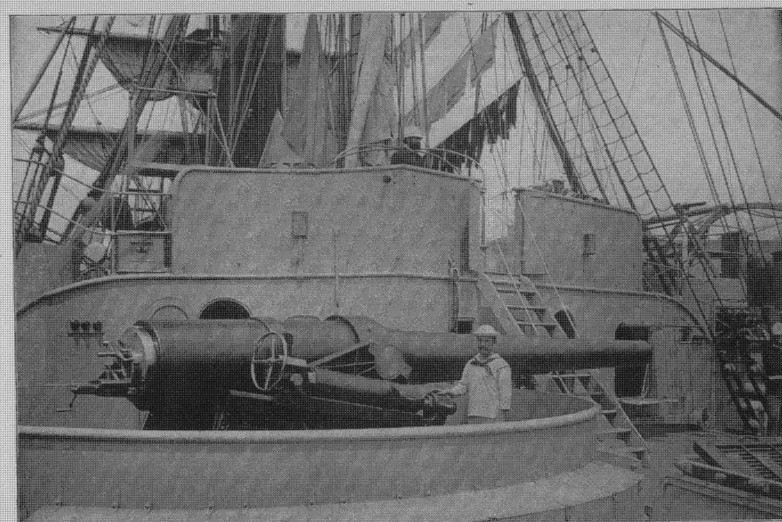
EFFECT ON BODY—EFFECT ON MIND.

Not one man in ten thousand has a clear idea of just what happens when a big cannon is fired. The physical manifestations are numerous. Even professors of chemistry and physics are stumped when they want to differentiate all the gases set loose and the peculiar effects they induce. The puff of whitish smoke, the flash of fire, the dim image of the flying projectile, the roar and the recoil are all familiar, but back of all these is a complex mass of phenomena most bewildering to the mind of any but an artillery expert.

First, the cubes, disks, hexagons or irregular lumps of powder are chemically transformed into a powerful, expanding gas the instant firing takes place. Then there are innumerable by-products that even chemists do not understand.

The explosion of gunpowder is divided into three distinct stages, called the ignition, inflammation and combustion. The ignition is the setting on fire of the first grain, while the inflammation is the spreading of the flame over the surface of the powder from the point of ignition. Combustion is the burning up of each grain. The value of gunpowder is due to the fact that when subjected to sufficient heat it becomes a gas which expands with frightful rapidity. The so-called explosion that takes place when a match is touched to gunpowder is merely a chemical change, during which there is a sudden evolution of gases from the original solid.

It has been calculated that ordinary gunpowder on exploding expands about nine thousand times, or fills a space this much larger as a gas than when in a solid form. When this chemical change takes place in a closed vessel the expansion



8-INCH FORWARD GUN ON THE "ATLANTA."

may be made to do a work like that of forcing a projectile along the bore of the great gun or test-tube in the line of least resistance.

The chemical composition of gunpowder is very simple. The ordinary English or brown gunpowder used at present in the United States Navy is composed of 75 per cent. potassium nitrate, 15 per cent. charcoal and 10 per cent. sulphur. At the instant of explosion the nitrate of soda gives off oxygen, which combines with the carbon of the charcoal, forming carbon-dioxide gas.

It has been calculated that only about 43 per cent. by weight of the powder is converted by the explosion into gas. The remaining 57 per cent. becomes a liquid the moment of explosion, and on solidifying becomes potassium sulphate, potassium carbonate and potassium sulphide. A great many other combinations take place, and various solids are formed which have never been successfully analyzed.

The ordinary charges placed in the 12-inch guns of the United States warships during this complicated chemical transformation exert a pressure on the walls of the cannon of about forty-three tons to the square inch. This force serves to start the projectile and develops a speed of 2019 feet per second by the time the shot reaches the muzzle of the cannon. Up to this stage of the explosion the chemical action has gone on in perfect silence. The tremendous report which plays such havoc with the nerves of the gunners is not caused by the explosion itself. But as the projectile emerges from the muzzle it leaves behind it a vacuum in the barrel of the gun, and the report is caused by the air in its rush to fill up this empty space.

The hardest work a gunner is called upon to do is to stand the tremendous shock. The forces exerted by these gases in expanding seem to radiate in all directions from the cannon, as ripples are caused by dropping a pebble in a pool of still water. As a matter of fact, it has been discovered that these lines of forces are exceedingly complicated affairs, and play very queer pranks about the cannon. As a result, few people know just which is the safest or the most dangerous position

for a gunner to take beside his gun. The center of disturbance at the moment of explosion is the mouth of the gun. In the case of the great 13-inch guns on our monitors, a position back of the gun is much easier than one nearer the muzzle.

In addition to this force there is an immense pressure exerted on the sides of the cannon, so that another distinct series of shocks also radiates outward from the barrel of the gun. These lines of force are influenced, besides, by the recoil of the gun, which tends to make the lines curve outward and intensifies the shock. These are in turn more or less compensated by the forces of the air opposing them as it rushes into the mouth of the cannon when the projectile leaves it. As a result of all these forces, the atmosphere is, of course, violently disturbed. Although no projectile strikes the gunner, who must stand by, it will be seen that the air is full of missiles in the form of invisible lines of force or vibrations which bombard, as it were, every part of the gunner's body at the same time.

An examination and analysis of the effect produced upon the human system and the mind by the firing of a cannon is most engrossing. Men generally accounted courageous tremble violently in their knees; others feel nauseated; some have severe headache; a few have had their eardrums split or the action of their heart affected.

Take the vital organ, the heart, first. In the space between the right auricle and ventricle are a set of fine, thread-like cords called the tendineae. The concussion makes them tremble like timbers in a building when there is an earthquake. In a weak man, the chamber of the heart is left open for an instant; the opening and closing springs lose their control; the heart shakes; possibly the chordae tendineae are snapped; contraction or dillation of the organ ensues and in some instances death follows.

Deafness induced by an explosion may be traced to the sudden pressure upon the inner orifice of the ear and the tremendous vibration set up. The thin, transparent, fairly bright membrane called the drum of the ear is burst, like a piece of tissue paper held taut and forcibly blown upon. Sounds are

conveyed by the beating of a tiny mallet upon this anvil. If the beating is too rapid and too forcible, the membranes may be ruptured, à temporary disturbance of the mind occurs and the sufferer becomes dizzy.

When the knees tremble it is due to the nervous shock produced in the cerebellum. All the nerves and muscles are thrown into atonic contractions and relaxations and the knees appear to give way.

Nausea is also caused by the physiological change that takes place in the brain. There is a pressure of blood there, and the stomach, responding, tries to empty itself.

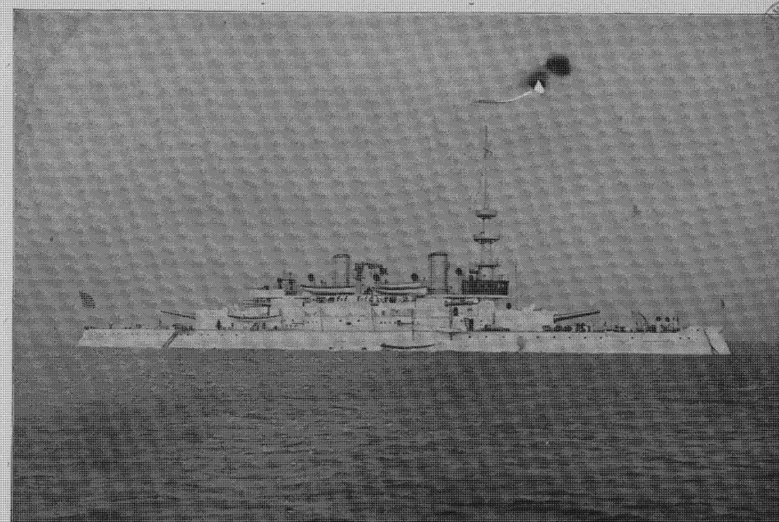
The whole nervous system, which resembles a mass of fibrous roots running all over the body, is affected when a cannon as large as an eight-inch gun is fired in close proximity. The nervous tissue of the body is divided into two different structural substances—the vesicular, which is grayish, and the fibrous, which is white. In the former nervous impressions and impulses originate; by the latter they are conducted. The gray matter forms the essential constituent of all ganglionic centers. A third structure—chiefly in the sympathetic system—is called gelatinous nerve tissue.

The nervous substances is again divided into two different systems. The first, connected directly with the great central mass inclosed in the skull and spine, is called the cerebrospinal system; the other, called the sympathetic system, consists of a double chain of ganglia with the branches that go to and come from them. The large brain, or cerebellum, is the center of disturbance when the visible effect is seen in trembling knees. The cerebrum is the headquarters where confusion succeeds the shock of the explosion and nausea ensues.

Other outward manifestations occur when a gun goes off. For instance, clothes may be torn or a man even knocked down by the concussion. At the battle of the Yalu Capt. Philo McGiffin, who was standing near a six-inch gun, had his trousers torn into ribbons on one leg and a long rent in the other; his uniform was as full of holes as a moth-eaten jacket, and he was nearly blinded and stunned. Yet he knew the gun was going to be discharged, but he did not realize how close he

was standing to the muzzle and how the gases liberated by the combustion radiated in all directions.

When the new battleships Kentucky and Kearsarge have practice drills in gunnery an interesting situation will arise. The gun turrets are placed directly over one another. If both guns are discharged simultaneously the men in the metallic confines of the turrets will occupy unenviable positions.



Speed, 17 Knots. OREGON (Battle Ship). Cost, $3,180,000.

CHAPTER XXXIII.

HOW THE PRESIDENT TRANSMITS HIS ORDERS.

ANY PART OF THE WORLD MAY BE REACHED BY WIRE—MESSAGES SENT IN CIPHER—DESPATCH BOATS IN THE NAVY.

How does the President, as Commander-in-Chief of the United States Army and Navy, maintain communication with all the force?

It is an elaborate and complicated system, which has been worked out and perfected by experts.

Its principal branch is telegraphy, and on this all its other features depend.

On the second floor of the War Department at Washington is the central station for the despatch and receipt of official war messages.

From that station run wires which form connections with every military post and signal station on the Atlantic and Gulf coasts, and to the headquarters of army and naval commanders.

By a system of loops the instruments in the War Department can be placed in communication with any part of the world that is reached by a cable or telegraph line.

Nearly all messages are sent in cipher, and the men who conduct this branch of the service are among the most important and most confidential employes of the government at this time.

They are the men whom Spanish spies might seek to tamper with.

If the President wishes to send an order to the army he makes it known to the Secretary of War; if to the navy, then to the Secretary of the Navy.

The order is first written out in plain English, and is then handed to the cipher clerks, who prepare it for the wires.

The operator who sends it does not know its meaning.

No one can read one of these messages without the aid of the cipher code.

One of these books, stoutly bound in leather, is kept on board of each ship, and at each army headquarters, always in the custody of responsible persons.

On the ships the code book is kept in a water-tight metal case, weighted with lead.

When a ship goes into action this case is put in a handy place by the commander, so that it can be thrown into the sea in case the ship is captured or disabled.

In the case of a fleet lying off shore, like that now investing Cuba, a system of patrol and despatch boats is maintained between the fleet and the shore.

That it may not always be necessary that these vessels should go to a regular port to deliver or receive messages, the coast signal stations, lighthouses, lightships and naval militia headquarters have direct telegraph lines to Washington, and a system of flag, semaphone and rocket signals for hailing patrol or despatch boats that may pass in sight of land by day or night.

This great system of communication is enormously expensive, but it has been proven to meet every requirement of the service, and is capable of extension to the active field of operations in Cuba should occasion require.

CHAPTER XXXIV.

FLAGS ON A MAN-OF-WAR.

THE FIGHTING GOES ON UNTIL A NATIONAL ENSIGN COMES DOWN FOR GOOD.

A story is told of a cabin boy on board a man-of-war who, by his action in pulling down the enemy's flag during a battle, gained a victory for his commander. The story illustrates the value of the national flag in a naval action, and how much depends upon the sailors seeing it flying from the masthead above them. It was just at the beginning of a battle between two ships that the cabin boy, who had never been in a fight, asked one of the sailors how long it would take the enemy to surrender, and what his own ship would have to do to beat the other.

"Do you see that?" asked the sailor, pointing to the flag which was flying from the masthead of the other ship. "As long as that is flying the other fellows will fight, but when it comes down they will stop and their ship will surrender."

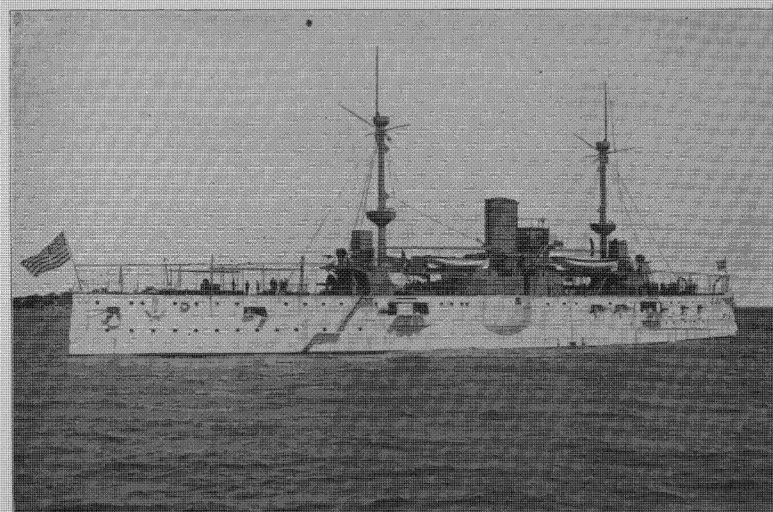
The cabin boy was too small to fight, but he made up his mind to get the flag for his Captain. During the battle, when the ships were lashed together, he crawled on board the enemy's vessel, and while the sailors were busy fighting climbed the rope ladder which ran up the mast, and, pulling the flag from its place, wrapped it around his body and carried it back to his own ship. The sailors were fighting bravely, until one, looking up and seeing that the flag was gone, cried out to his companions that the Captain had pulled down the flag, and there was no use fighting longer. The men threw down their arms, and the mistake was not discovered until it was too late, for the cabin boy's comrades had seized the ship.

The flag of his country is what every sailor and soldier throughout the world fights for during a battle; when the flag

is gone they lose heart and give up easily. Some of the bravest deeds have been in defence of the flag, and to get it back again when the enemy have captured it. When a ship goes into battle the national flag is run up to the masthead, the highest point on the vessel, where it flies until the engagement is over. Sometimes, when the other ship is the stronger, or its sailors fight better, and the Captain sees that he is beaten, he pulls down his flag to show the enemy that he has had enough and wants to surrender. This act is called "striking the colors." It is a usual thing to run up a white flag in the place of the one which has been hauled down, but often the simple act of striking the colors is enough to end a battle. So long as the Captain of a ship sees any flag except a white one flying from the enemy's vessel he will continue to fire upon it, for it is a sign that the sailors have not given up and are ready to fight longer.

Sometimes, during a naval battle, the ropes which hold the flag are shot away, but in such cases there are always some brave sailors who will climb the mast and put another in its place. During the Revolutionary War, when the ship commanded by Paul Jones was fighting an English vessel, the American flag was shot away and fell overboard into the water. One of the sailors, who saw it fall, jumped after it, and although he was wounded swam with it back to the ship, when it was fastened to the top of the mast again. When the flag went overboard the Englishmen began to cheer, for they thought that Paul Jones had surrendered, but when they saw it flying from the masthead once more they changed their minds and finally surrendered themselves. The action of the wounded sailor in jumping into the water to rescue the flag made his companions fight all the harder.

Every one who has read American history knows about the battle of Lake Erie, and of how Commodore Perry carried the flag from his sinking ship and hoisted it upon another. When the English Captain saw Perry going in a rowboat from the sinking ship with the flag thrown over his shoulder, he ordered his sailors to sink the boat so that the flag couldn't be hoisted at the masthead of another American vessel. He



Speed, 17 Knots. TEXAS (Battle Ship). Cost, $2,690,000.

knew that if the American sailors saw that their flag was lost they would lose heart and surrender, and as he expected, when they saw the flag flying again they worked the harder and finally beat all his ships.

A ship going into action carries several flags: the national colors, which are hoisted in the most prominent place; the union jack, the pennant, which is a long, narrow streamer flying from the mast head, and a set of signal flags, which are used to send messages from one ship to another. When a squadron of vessels under an Admiral goes into a fight the flagship flies, besides the other flags mentioned, one which denotes the rank of that officer. In the old days, when war vessels were made of wood and had three masts, most of the flags were hoisted to the top of these masts. Nowadays, however, many of our fighting ships have only one mast, and several flags may be hoisted upon that, but the Stars and Stripes are always at the top. Sometimes a flag is hoisted at the end of the yardarm, usually in the case of signal flags.

When the squadron is waiting for the enemy's ships and they are sighted, the signal "prepare for action" is run up on the flagship. During all the naval wars it has been the custom for the Captains of naval vessels to have on board the flags of other countries besides their own, and frequently one of these flags is used to advantage. During one of the long naval wars between England and some of the other European countries the Captain of a small English war vessel sighted several big French men-of-war, which, did they attack him, would have either sunk or captured his vessel. France and Spain were fighting against England, so he made haste to pull down the British flag and run up in its stead a Spanish one. When the Frenchmen saw the latter flag they did not bother with the little vessel and the Englishman escaped.

During the War of 1812 an English Captain made himself a great deal of trouble through fear that some of the sailors on board his ship might pull down his flag before he had beaten the enemy. Just before the battle he ordered a sailor to climb to the top of the mast and nail the flag there. The American ship proved the better, and before long the English-

man wanted to surrender, but when he wished to pull down his flag he couldn't. The sailors were busy fighting, so the Captain himself had to climb the mast and tear down the British ensign.

There have been instances where the commander of a ship nailed his flag to the mast and left it flying there until the vessel sank. The last object which appeared above the water was the colors, and even the victorious enemy cheered the sinking flag.

CHAPTER XXXV.

MARKSMANSHIP.

SUPERIOR SKILL OF UNCLE SAM'S GUNNERS DUE TO PRACTICE AND SYSTEM.

Our two naval victories, the silencing of the batteries at Matanzas, by Sampson, and the bombardment of Manila, by Dewey, have caused a thrill of pride to permeate the breast of every true American citizen. The thing that has impressed us most is the superior marksmanship of our gallant defenders of the Stars and Stripes. The Spaniards have apparently been unable to do any execution with their guns, while every shot fired from an American ship seems to have told a tale of destruction.

The natural query is, "Why is it?" How, asks the average citizen, who is not conversant with naval affairs, can our ships do such damage without retaliation? And the unthinking ones set it down as an evidence of the luck of war.

But it is no such thing. It is the result of constant drilling and a beautifully disciplined navy. There are too many calamity-howlers in America. It would be better should we blow our own horns a little more. There is too great a tendency to apologize for our insufficient navy. Does Matanzas warrant it? Isn't Manila sufficient proof that our sailor boys can more than take care of themselves?

As a matter of fact, our boys can give the defenders of Spain cards and spades in the matter of marksmanship. That much has been proven to our own satisfaction and to the discomfiture of the Dons. And if you come right down to it, there is no little comfort in the assurance of our superiority in this respect over most of the navies of the world.

THE COST OF IT.

It is no inexpensive thing, this drilling of gunners. It is a luxury which Spain cannot afford. Hence her poor showing in the recent encounters which she has had with our ships. This fact may be easily understood when you realize that during the bombardment of Matanzas, Uncle Sam paid $200 every time the Puritan discharged one of her big guns.

Of course, in practice this would be extremely expensive. Consequently our navy has adopted other means of insuring proficiency on the part of her gunners. Our ships are obliged to have target practice with big guns at least once every three months, when the number of shots to be fired is prescribed by regulations, which vary as the men grow in proficiency. The great expense attached to this necessarily reduces the number of shots fired from each gun.

But in order that practice may be kept up, daily drills are substituted, either in the form of sub-caliber or aiming drills.

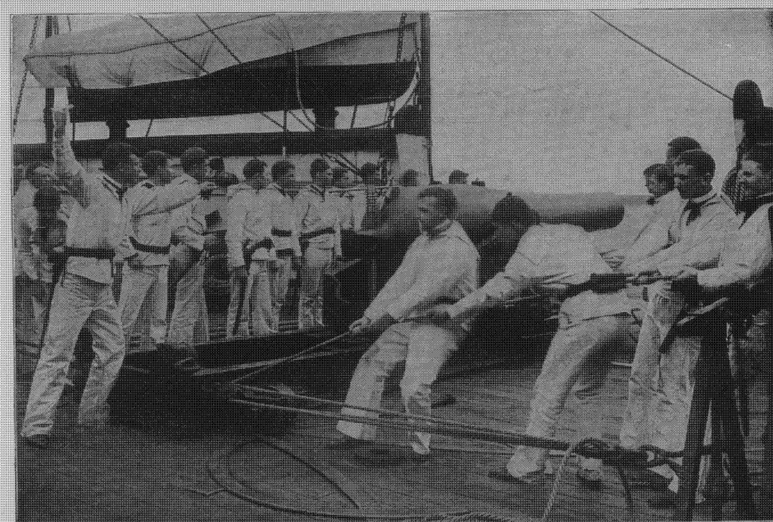
The great gun practice takes place under conditions as near as possible to those which would arise in actual warfare. The target is anchored, and the guns are trained on it both while the ship is moving and while she is stationary.

This target is placed upon a platform supported by barrels. Up from the center comes a pole, on the summit of which is attached a red flag. Then there are four protruding canvas wings or sails, with a semi-circle painted on each, so that no matter which way the target shifts, there is always a bulls'-eye to aim at.

SHOT AND POWDER FOR DRILLS.

The target may be placed at any distance outside of 1000 yards from the vessels. Twelve hundred yards is usually the range. To each gun is allotted a certain number of fires, or "strings," as they are technically called.

The total number of shots fired during one quarter for a ship, say of the Texas class, would be 642. Two 12-inch guns would fire three shots each, one each with full charge, and



UPPER TRAINING SHIP GUN PRACTICE.

two each with reduced charges. The weight of the shot would be 800 pounds, and the charge of powder from 300 to 400 pounds.

Then there would be thirty-six shots for six six-inch guns, 288 from twelve six-pounders, 144 from six one-pounders and ninety-six from four Hotchkiss revolving cannon. Six shrapnel from six-inch guns and twenty-two additional shots would be allowed the secondary battery in order to give others than those regularly stationed at the guns practice in marksmanship.

These days of great gun drill are epochs in the lives of our sailor boys. Four observers are employed to note the accuracy of the fire. Two are in small boats on the water. They determine by means of graduated T squares the point of fall of the shot, whether it be to the right or the left of the target, and whether the shot has gone short or over the mark.

The other two observers are stationed on the ships. One notes the number of shot and records the apparent fall as it appears to the fourth observer, who watches the flight of the projectile. A similar record of shots is kept by each of the observers in the boats. This system applies particularly to when the ship is stationary. In moving practice, whenever possible, the same system of recording is observed, but there are times when this is impossible, owing to the condition of the sea.

Regular reports are made to the admiral of the fleet, and the successful gunners are then indeed happy. Money prizes are given to the best marksmen of the various ships, and quarterly the Bureau of Navigation issues a printed circular, showing the relative standing of each ship in the service as to target practice.

This list contains the names of all the best marksmen of each ship, arranged in order of merit. This in itself fosters a spirit of emulation among the men as well as a keen rivalry between the ships, and even among the gun divisions of the same ship. The honor thus gained is by far more highly appreciated by Jack than the mere money prize.

But it must be remembered that the actual firing of the big

guns is a great expense. It is a luxury which might easily bankrupt a nation, if persistently kept up. Consequently, the sub-caliber and the aiming drills are those which are practiced daily.

The former practically brings into play the same degree of skill in sighting and manipulating the big fellows. But instead of actually firing the great guns, with their massive charges, a rifle or musket is placed inside the bore, and the shot is discharged from that. There is a circular frame, with four supports, which fits inside the bore, and this supposts the small firearm in position. The gunner thus has practically the same opportunity to exercise his skill and accuracy and to manoeuvre the big gun as he would have if it were heavily charged.

A DRILL WITHOUT SHOOTING.

The aiming drill is a most interesting operation, in that no shot is actually fired, and yet the greatest degree of accuracy is obtained. In this drill the marksman mounts a rifle on a tripod, at a distance of usually thirty feet from the target, the operation taking place on the main deck.

The target is a piece of blank paper, ruled off into squares, and nailed upon a wooden background about the size of an ordinary door. At the side of this stands the gunner's mate, holding in his hand a circular disk made of tin and perforated in the center with a small hole. This disk has a handle, and the gunner's mate holds it over the target.

The man at the gun sights his weapon, aiming at the hole in the center of the disk, which he tries to get as near the exact center of the target as possible. As he squints along the barrel he calls out to the gunner's mate where to sight the disk.

Right, left, up and down goes the piece of tin, according to the direction shouted out by the marksman. When he thinks he has trained his rifle so that it points directly at the center of the target, and the ball would go through the hole in the disk, he shouts "Stop!"

TO GROUP THE SHOTS.

Then the gunner's mate takes a pencil, and holding the disk in position, makes a mark through the center upon the paper target. This operation is repeated three times, and then the next man has his trial. The idea of the three shots is to get them as closely together on the target as possible—that is, the three pencil marks forming the smallest triangle constitute the best marksmanship. To determine the center of the triangle formed by the three pencil marks is a simple mathematical calculation, and thereon hinges the result of accuracy.

Pistol practice among the officers is also largely indulged in. The poop deck is usually the scene of this, and the target is an ordinary iron one, with paint pot and brush close at hand. Somebody will suggest a trial at skill, with a round of beer to go against the score of the poorest marksman. But it is all good practice.

Whenever possible our navy is perfecting itself in marksmanship. Practice with rifles and revolvers takes place both afloat and ashore at very frequent intervals. And that is why our navy has been so successful in recent encounters. It is one thing not to flinch under fire through pure bravery, and it is another thing to realize that bravery is backed up by the consciousness of superior skill. And that is why our gallant tars have won such universal praise.

CHAPTER XXXVI.

OUR FIGHTING SHIPS.

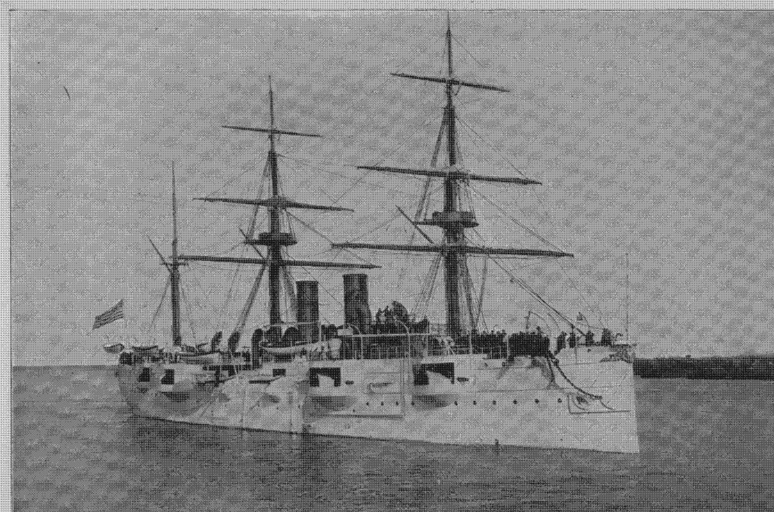
LIST OF VESSELS COMPRISING THE UNITED STATES NAVY.

ATLANTA—Protected cruiser; single screw; commissioned July 19, 1886; length, 271 feet; breadth, 42 feet; draught, 16 feet; speed, 15½ knots; main battery, six 6-inch and two 8-inch breech-loading rifles; secondary battery, two 6-pounder, two 3-pounder and four 1-pounder rapid-fire guns, two 47-millimeter Hotchkiss revolving cannon and two gatlings; thickness of protective deck, 1½ inches on the slope and flat; 19 officers, 265 men; contract price, $617,000.

BALTIMORE—Protected cruiser; twin screw; commissioned January 7, 1890; length, 327 feet 6 inches; breadth, 48 feet 7½ inches; draught, 19 feet 6 inches; speed, 20 knots; main battery, four 8-inch and six 6-inch breech-loading rifles; secondary battery, four 6-pounder, two 3-pounder and two 1-pounder rapid-fire guns, four 37-millimeter Hotchkiss revolving cannon and two gatlings; thickness of protective deck, 4 inches on slope, 2½ on the flat; 36 officers, 350 men; price, $1,325,000.

BOSTON—Protected cruiser; single screw; commissioned May 2, 1887; length, 271 feet 3 inches; breadth, 42 feet 1¾ inches; draught, 16 feet 10 inches; displacement, 3000 tons; speed, 15½ knots; main battery, six 6-inch and two 8-inch breech-loading rifles; secondary battery, two 6-pounder, two 3-pounder and two 1-pounder rapid-fire guns, two 47 and two 37-millimeter Hotchkiss revolving cannon and two gatlings; thickness of protective deck, 1½ inches on the slope and flat; 19 officers, 265 men; contract price, $619,000.

BROOKLYN—Armored cruiser; completely armored, besides having steel foundation; total displacement 9271 tons and speed of 22 knots; armament, eight 8-inch breech-loading rifles, eight 5-inch breech-loading rifles, rapid-fire, twelve 6-pounders, rapid-fire; twelve 6-pound-



Speed, 19 Knots NEWARK (Protected Steel Cruiser). Cost, $1,284,000.

ers, four 1-pounders, three torpedo tubes and four gatling guns; 46 officers, 515 men; cost, $2,986,000.

CHARLESTON—Protected cruiser; twin screw; commissioned December 26, 1889; length, 312 feet 7 inches; breadth, 46 feet 2 inches; draught, 18 feet 7 inches; speed, 18 knots; main battery, two 8-inch and six 6-inch breech-loading rifles; secondary battery, four 6-pounder, two 3-pounder and two 1-pounder rapid-fire guns, four 37-millimeter Hotchkiss revolving cannon and two gatlings; thickness of protective deck, 3 inches on the slope, 2 inches on the flat; 20 officers, 280 men; price, $1,017,500.

CHICAGO—Protected cruiser; twin screw; commissioned April 17, 1889; length, 325 feet; breadth, 48 feet 2 inches; draught, 19 feet; speed, 15 knots; main battery, four 8-inch, eight 6-inch and two 5-inch breech-loading rifles; secondary battery, nine 6-pounder and four 1-pounder rapid-fire guns, two 37-millimeter Hotchkiss revolving cannon and two gatlings; thickness of protective deck, 1½ inches on slope and flat; 33 officers, 376 men; cost, $889,000.

CINCINNATI—Protected cruiser; twin screw; commissioned June 16, 1894; length, 300 feet; breadth, 42 feet; draught, 18 feet; speed, 19 knots; main battery, ten 5-inch and one 6-inch rapid-fire guns; secondary battery, eight 6-pounder and two 1-pounder rapid-fire guns and two gatlings; thickness of protective deck, 2½ inches on slopes, 1 inch on the flat: 20 officers, 202 men; cost, $1,100;000.

COLUMBIA—Protected cruiser, without armor belts; 6735 tons displacement and speed of 23 knots; armament, one 8-inch breech-loading rifle, two 6-inch rapid-fire guns, eight 4-inch rapid-fire guns, twelve 6-pounders, four 1-pounders and four gatling guns; 35 officers, 429 men; cost, $2,725,000.

INDIANA—Battleship; twin screw; commissioned November 20, 1895; length, 348 feet; breadth, 69 feet 3 inches; draught, 24 feet; speed, 16 knots; main battery, four 13-inch, eight 8-inch and four 6-inch breech-loading rifles; secondary battery, twenty 6-pounder and six 1-pounder rapid-fire guns and four gatlings; thickness of armor, 18 inches; 36 officers, 434 men; cost, $3,020,000.

IOWA—Battleship; twin screw; length, 360 feet; breadth, 72 feet 2½ inches; draught, 24 feet; speed, 17.08 knots; main battery, four 12-inch and eight 8-inch breech-loading rifles and six 4-inch rapid-fire guns; secondary battery, twenty 6-pounder and four 1-pounder rapid-fire guns and four gatlings; thickness of armor, 14 inches; 36 officers, 450 men; contract price, $3,010,000.

MAINE—Battleship; twin screw; commissioned September 17, 1895; length, 318 feet; breadth, 57 feet; draught, 21 feet 6 inches; speed, 17½ knots; main battery, four 10-inch and six 6-inch breech-loading rifles; secondary battery, seven 6-pounder and eight 1-pounder rapid-fire guns and four gatlings; thickness of armor, 12 inches; 34 officers, 370 men; contract price, $2,500,000.

MARBLEHEAD—Unarmored cruiser; twin screw; commissioned April 2, 1894; length, 257 feet; breadth, 37 feet; draught, 14 feet 7 inches; speed, 19 knots; main battery, nine 5-inch rapid-fire guns; secondary battery, six 6-pounder and two 1-pounder rapid-fire guns and two gatlings; 20 officers, 254 men; cost, $674,000.

MASSACHUSETTS—Battleship; 10,288 tons displacement, and a speed of about 17 knots when forced; completely armored, with only one fighting top, and carries four 13-inch breech-loading rifles, four 8-inch rapid-fire rifles, twenty 6-pounders and four gatling guns; 37 officers, 438 men; cost, $3,020,000.

MINNEAPOLIS—Protected cruiser, not completely armored; 7375 tons displacement and capable of speeding 23½ knots; armament, one 8-inch breech-loading rifle;

two 6-inch rapid-fire guns, eight 4-inch rapid-fire guns, twelve 6-pounders, four 1-pounders and four gatling guns; 38 officers, 458 men; cost, $2,690,000.

MONTGOMERY—Protected cruiser; twin screw; length on water line, 257 feet; breadth, 37 feet; draught, 14 feet 6 inches; speed, 17 knots; main battery, two 6-inch and eight 5-inch rapid-fire guns; secondary battery, six 6-pounder and two 1-pounder rapid-fire guns and eleven gatlings; water-tight steel decks, 11-16 inch thick; 13 officers, 228 men; cost, $612,500.

NEWARK—Protected steel cruiser; twin screw; commissioned February 2, 1891; length, 310 feet; breadth, 49 feet 2 inches; draught, 19 feet; speed, 19 knots; main battery, twelve 6-inch breech-loading rifles; secondary battery, four 6-pounder, four 3-pounder and two 1-pounder rapid-fire guns, four 37-millimeter Hotchkiss revolving cannon and four gatlings; 34 officers, 350 men; cost, $1,248,000.

NEW YORK—Armored cruiser; twin screw; commissioned August 1, 1893; length, 380 feet 6½ inches; breadth, 64 feet 10 inches; draught, 23 feet 3½ inches; speed, 21 knots; main battery, six 8-inch breech-loading rifles and twelve 4-inch rapid-fire guns; secondary battery, eight 6-pounder and four 1-pounder rapid-fire guns and four gatlings; thickness of armor, 4 inches; 40 officers, 526 men; contract price, $2,985,000.

OLYMPIA—Protected cruiser; twin screw; length on water line, 340 feet; breadth, 53 feet; draught, 21 feet 6 inches; speed, 20 knots; main battery, four 8-inch guns and ten 5-inch rapid-firing guns; secondary battery, fourteen 6-pounder and six 1-pounder rapid-fire guns and four gatlings; protected steel decks, from 2 to 4¾ inches; 20 officers, 293 men; cost, $1,796,000.

OREGON—Battleship; twin screw; commissioned July 15, 1896; length, 348 feet; breadth, 69 feet 3 inches; draught, 24 feet; speed, 16.79 knots; main battery, four 13-inch, eight 8-inch and four 6-inch breech-loading rifles; sec-

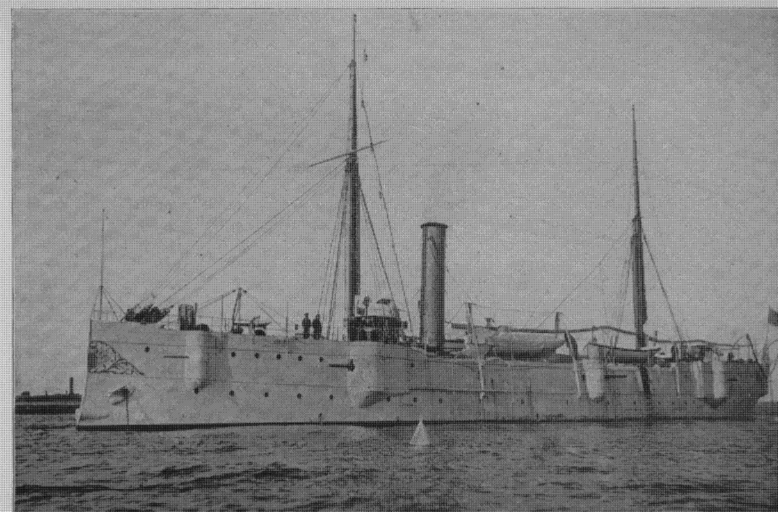
ondary battery, twenty 6-pounder and six 1-pounder rapid-fire guns and four gatlings; armor on sides, 18 inches thick; 32 officers, 441 men; cost, $3,180,000.

PHILADELPHIA—Protected cruiser; twin screw; commissioned July 28, 1890; length, 327 feet 6 inches; breadth, 48 feet 7½ inches; draught, 19 feet 2½ inches; displacement, 4324 tons; speed, 19½ knots; main battery, twelve 6-inch breech-loading rifles; secondary battery, four 6-pounder, four 3-pounder and two 1-pounder rapid-fire guns, three 37-millimeter Hotchkiss revolving cannon and four gatlings; thickness of protective deck, 4 inches on the slopes, 2½ inches on the flat; 34 officers, 350 men; cost, $1,350,000.

RALEIGH—Protected Cruiser; twin screw; length, 300 feet; breadth, 42 feet; draught, 18 feet; speed, 19 knots; main battery, one 6-inch gun and ten 5-inch rapid-fire guns; secondary battery, eight 6-pounder and four 1-pounder rapid-fire guns and 11 gatlings; protected steel deck, 2½ inches thick; 20 officers, 293 men; cost, $1,100,000.

SAN FRANCISCO—Protected cruiser; twin screw; commissioned November 15, 1890; length, 310 feet; breadth, 49 feet 2 inches; draught, 18 feet 9 inches; displacement, 4098 tons; speed, 19½ knots; main battery, twelve 6-inch breech-loading rifles; secondary battery, four 6-pounder, four 3-pounder and two 1-pounder rapid-fire guns, three 37-millimeter Hotchkiss revolving cannon and four gatlings; thickness of protective deck, 3 inches on the slope and 2 inches on the flat; 33 officers, 350 men; cost, $1,428,000.

TEXAS—Battleship; 6315 tons displacement and a speed of 17 knots; carries two 12-inch breech-loading rifles; six 6-inch breech-loading rifles, twelve 6-pounders; six 1-pounders and two 37-millimeter Hotchkiss repeating cannon; 38 officers, 456 men; cost, $2,690,000.



Speed, 16 Knots. CASTINE (Gun Boat). Cost, $318,500.

Additional Vessels of the United States Navy.

Their Dimensions, Capacity and Cost.

VESSELS.	Keel Laid.	Speed Knots.	Length Load Water Line.	Mean Draught.	Thickness Armor Plate.	Officers and Men.	Cost.
Double Turret Monitors.	Year.		Ft. In.	Ft. In.	In.		
Amphitrite	1874	12.0	259.6	14.6	9	171	$3,178,046
Miantonomah	1874	10.5	259.6	14.6	7	149	3,178,046
Monadnock	1874	14.5	259 6	14.6	9	171	3,178,046
Monterey	1889	13.6	256.0	14.10	13	191	1,628,950
Puritan	1875	12.4	289.6	18.0	14	222	3,178,046
Terror	1874	12.0	259.6	14.6	7	151	3,178,046
Single Turret Monitors.							
Ajax	1862	5-6	....	....	....	....	626,582
Canonicus	1862	6	....	....	....	....	622,963
Catskill	1862	6	....	....	....	....	427,766
Comanche	1862	5-6	....	....	....	....	613,164
Jason	1862	5-6	....	....	....	....	422,766
Lehigh	1862	5-6	....	....	....	....	422,766
Mahopac	1862	6	....	....	....	....	635,374
Manhattan	1862	6	....	....	....	....	628,879
Montauk	1862	5-6	....	....	....	....	423,027
Nahant	1862	5-6	....	....	....	....	413,515
Nantucket	1862	5-7	....	....	....	....	408,091
Passaic	1862	5-6	....	....	....	....	423,171
Wyandotte	1862	6	....	....	....	....	633,327
Gunboats.							
Annapolis	1896	12.0	168.0	12.0	....	146	230,000
Bennington	1888	17.5	230.0	14 0	...	197	490,000
Castine	1891	16.0	204.0	12.0	..	154	318,500
Concord	1888	16.8	230.0	14.0	....	193	490,000
Helena	1894	13.0	250.9	9.0	..	170	280,000
Machias	1891	15.4	204.0	12.0	..	154	318,000
Marietta	1896	12.0	174.0	12.0	...	146	230,000
Nashville	1894	14.0	220.0	11.0		169	280,000
Newport	1896	12.0	168.0	12.0		146	230,000
Petrel	1887	11 7	176 0	11 7	..	132	247,000
Princeton	1896	12 0	168.0	12 0	....	146	230,000
Vicksburg	1896	12.0	168.0	12.0	...	146	230,000
Wheeling	1896	12 0	174 0	12.0	....	146	230,000
Wilmington	1894	13 0	250 9	9.0	..	170	280,000
Yorktown	1887	16.14	230.0	14.0	....	192	455,000
Special Class.							
Bancroft	1891	14.3	188 0	11.6	....	130	250,000
Dolphin	1883	15.5	240 0	14.3	..	115	315,000
Torpedo Cruiser	....	....	....	....	....	....	....
Vesuvius	1887	21.4	252.0	10.1	....	70	350,000

ADDITIONAL VESSELS OF THE UNITED STATES NAVY.—Continued.

VESSELS.	Keel Laid. Year.	Speed Knots.	Length Load Water Line. Ft. In.	Mean Draught. Ft. In.	Thickness Armor Plate. In.	Officers and Men.	Cost.
Torpedo Boats.							
Bailey	1897	30.0	205.0	6.0	...	...	$210,000
Cushing	1888	22.5	139.0	4.11	....	23	82,750
Dahlgren	1897	30.5	147.0	4.7	....	...	194,000
Davies	1897	22.5	146.0	5.4	....	....	81,546
Du Pont	1896	27.5	175.7	5.6	....	20	147,000
Ericsson	1892	24.0	149.0	4.9	...	23	113,500
Farragut	1897	30.0	210.0	6 0	...	....	227,500
Foote	1896	24.5	160.6	5 0	...	20	97,500
Fox	1897	22.5	146.0	5.4	...	....	85,000
Goldsborough	1897	30.0	191.8	5.0	....	....	214,500
Gwin	1897	20.0	100.0	3 6	...	..	39,000
McKee	1897	20.0	106.6	4.3	....	....	45,000
MacKenzie	1897	20.0	106.6	4.3	....	....	48,500
Morris	1897	22.5	147.3	4.6	....	....	89,000
Porter	1896	27.5	175.9	5.6	....	20	147,000
Plunger	1896	8.0	85.0	....	...	....	150,000
Rodgers	1896	24.5	160.0	5.0	....	20	97,500
Rowan	1896	26.0	170.6	5.6	....	20	100,000
Stiletto	....	18.2	88.6	3.0	....	.6	25,000
Stringham	1897	30.0	225 0	6.6	....	....	236,000
Talbot	1897	20.0	100.0	3.6	....	....	39,000
T. A. M. Craven	1897	30.5	147.0	4.7	....	..	194,000
Winslow	1896	24.5	160.4	5.0	...	20	97,500

BOATS BOUGHT FROM BRAZIL, MARCH 14, 1898.

Unarmored Steel Vessels.							
Admiral Abreuall	1897	22.0	330.0	16.10	3.5	300	....
Amazonas	1897	22.0	330.0	16.10	3.5	300	....

These last two boats are now named Albany and New Orleans respectively.

There are five battleships now under construction of 11,520 tons displacement, 10,000 horse-power; six gunboats of 1000 tons displacement, 800 horse-power; about twenty torpedo-boats, for which bids have been called. A submarine torpedo-boat, which was being built, has recently been completed; also a tug of 225 tons displacement and 400 horse-power is now under construction.

OLD NAVY VESSELS: Old Iron Vessels—Alarm, 1874; Alert, 1873; Michigan, 1844; Monocacy, 1863; Pinta, 1865; Ranger, 1873. Old Wooden Vessels—Adams, 1874; Alliance, 1873; Enterprise, 1873; Essex, 1874; Hartford, 1858; Lancaster, 1858; Marion, 1871; Mohican, 1872; Thetis, ——; Yantic, 1864.

The above are all steam vessels. In addition to the old navy vessels enumerated above are the following sailing vessels: Receiving-ship Constellation, 10 guns, built 1854; Training-ships Monongahela, 12 guns, built 1862, and Portsmouth, 15 guns, built 1843, and School-ships Jamestown, St. Mary's and Saratoga.

The following-named steel, iron and wooden steam tugs are a part of the naval force: Fortune, Leyden, Nina, Rocket, Standish, Triton, Iwana, Wahneta, Narketa, Traffic, Unadilla and No. 5. Their horse-power varies from 147 to 500 each.

FIVE GREAT BATTLESHIPS.

In addition to the ships mentioned above, the United States is building five great battleships. The Illinois, Alabama and Wisconsin are rapidly advancing, and will be launched in the fall. Their cost will be about $3,000,000 each. As the vessels are sister ships, a description of one applies equally to the others, and the principal dimensions and general features are—length on load water line, 368 feet; beam, extreme, 72 feet 2.5 inches; displacement, 11,525 tons; draught, 23 feet 6 inches; speed (estimated), 16 knots; complement, 490. These ships are the most formidable battleships we have yet designed. The main battery will consist of four 13-inch breech-loading rifles, supplemented by fourteen 6-inch rapid-fire guns. The 13-inch guns are mounted in two balanced barbette turrets of 15-inch Harveyized steel—the defensive equivalent of twenty-two inches of ordinary steel—while the face plates about the gun-ports are two inches thicker. The Kearsarge and Kentucky were recently launched at Newport News, Va. and are among the most formidable battleships in the world. These are sister ships, having an estimated speed of 16 knots; 368 feet in length; a draught of 23 feet 6 inches; displacement of 10,000 tons; officers and men 525; will cost in round numbers $3,000,000 each.

CHAPTER XXXVII.

FIGHTERS BELOW DECKS.

MEN DOWN THERE TOIL AND SUFFER, BUT THEY CANNOT SEE THE BATTLE.

"Captain Cook, keep your men below the protective deck informed of any advantage we may gain," said Commodore Schley. Speaking loudly to overcome the noise of the frightful guns, the gallant captain of the Brooklyn said, with a smile:

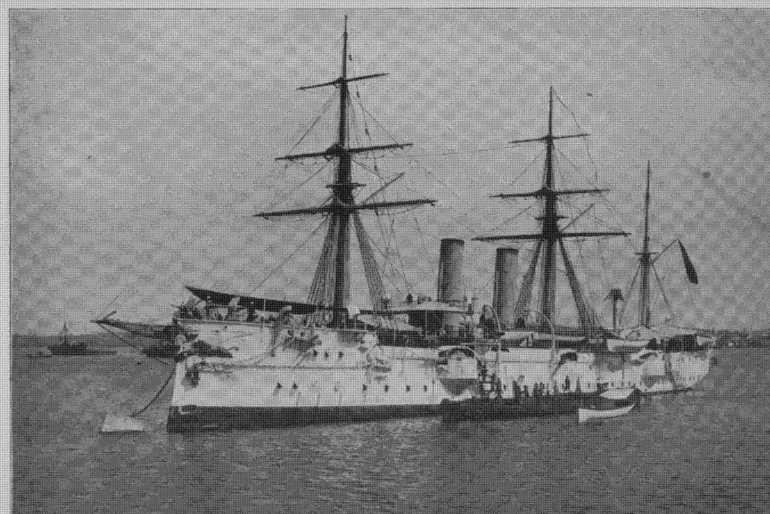
"I always do that, sir. I consider it necessary for the esprit de corps."

Stepping into the conning tower, he called down the tubes:

"Tell the men below that the Maria Teresa is running ashore."

At the same time Executive Officer Mason rushed to the firing turrets and called to the men the same joyful news.

It was July 3, and the excitement of the first call to battle had hardly subsided on the big cruiser Brooklyn when the incident just described occurred. Commodore Schley stood



SPANISH CRUISER—HAVANA HARBOR.

upon a small temporary bridge running about the conning tower, while Captain Cook spent his time between the interior of the tower, where he directed the machinery, and the platform, where he could see the enemy.

Fighting for the honor of America against three better-prepared and more heavily armored ships of Spain, this splendid type of the American navy was one mass of flame and smoke as she hurled out defiance and death, with machine-like regularity, and yet but one-third of the entire crew could see the enemy or any part of the fighting. In the big turrets half-naked men worked behind the steel walls with no knowledge of how the battle went, and below the protective deck fully 300 or more men worked under the glare of electric light, keeping this great engine of destruction mechanically and rapidly at work. The big turret eight-inch guns could not have done their deadly shooting even with the trained eyes guiding them had not the men below sent up the ammunition, and the Brooklyn could not have kept up her speed had it not been for the engineer and fireroom force working below the deck like fiends.

WORKING THE BIG GUNS.

The men in the turrets of five-inch steel see as little as the men below deck, except that once in a while they get a glimpse of the object fired at. When the ships of Spain were sighted coming out on the eventful morning, the eight and five-inch guns were all loaded, and in each turret within two minutes after the summons eleven men stood half-naked awaiting the word to fire.

The chief of the turret, a lieutenant, is in the hood, his eye to the telescope, gets the line of his gun on the harbor and

awaits the signal. "Five thousand yards," sings out an orderly in the turret opening, and the gun goes up to the proper elevation as the lieutenant in the hood orders the elevating gear turned.

The number one man at the gun connects the electric wire to the primer, with the hood's hand firing apparatus, and all is waiting. "Commence firing," is the order, and quickly the answer comes. The turret lieutenant's hand closes on the electric apparatus and the gun jumps back a foot or more as 110 pounds of exploding powder drives a 250-pound shell from the muzzle of the great piece at a rate of 2080 feet per second.

Then before the roar has ceased the hand of the man in charge of the turret touched the electric lever, and the great 700 tons of steel is moved quickly and almost noiselessly around until the other gun of the twins is in the same position as the first one had been.

Slowly the muzzle comes up to the right elevation; once more the fingers close on the electric handle, and another 250 pounds of steel shoot away on a death errand.

QUICK WORK IN RELOADING.

If you could have looked in this particular turret on that memorable and glorious morning of July 3, you would have seen a picture of activity that would have amazed you. Hardly had gun number one belched forth its defiance to the group of Spanish ships, when the five men behind it, until that minute statues of inactivity, spring into life. No. 2 and No. 4 open the breech, wash off the "mushroom" and gas check with a sponge, oil the breech plug, extract the exploding primer and see the vent clear. No. 4 seizes the long bristle sponge, wet

with water, and assisted by No. 3, sponges the gun, puts aside the sponge and seizes the rammer ready to drive home the new charge.

While they have been working there have appeared at the top of the ammunition hoist new shells and new ammunition, and the officer in command of the turret cried "load."

No. 5 raises the ammunition corner of the hoist, and with the assistance of No. 5 of the other gun, grasps the handles upon the carriage and swings it to the rear of the gun. The projectile is first on the left, and No. 3 adjusts the primer, while No. 4, assisted by No. 6, rams home the 250-pound projectile.

Then in quick succession No. 5, No. 4 and No. 6 ram in the two charges of powder in packages of fifty-five pounds each, done up in serge or muslin and in grains weighing an ounce and one-quarter each. No. 2 closes the breech, No. 1 again connects the wire and the gun is ready to fire.

All this has taken just four minutes, and with two guns the big turret is shooting once every two minutes.

MEN WHO SEND UP AMMUNITION.

But where are the mysterious hands that send up these death-dealing charges to the guns in such a ghostlike way? Down below the water-line of the ship, beneath the protective deck, is a naked, perspiring crowd of men, their eyes effectually closed to the changing scene of battle, but their senses keenly alive to the fact that torpedo or shell below, or through the armor belt, may mean death. These men work with an energy that proves their patriotism and devotion to the flag. On this day in question they sent up to the various turrets and guns over 70,000 pounds of ammunition, taking it carefully out of the big magazines without accident.

Down the hoists and chutes comes the powder smoke to add to the already high temperature of the handling-room, followed by the hot saltpeter water from the sponging of the guns, making the decks slippery and burning blisters on the bare backs of the men underneath, who, groping and choking, feeling their way through the dense smoke, go silently and obediently about their work with but one thought and aim in view—to keep these cars and hoists filled with powder and projectiles, not knowing how the battle is raging until a cheer is finally heard from deck, when their spirits brighten and an old salt will exclaim:

"I guess they must have hit 'em that time!"

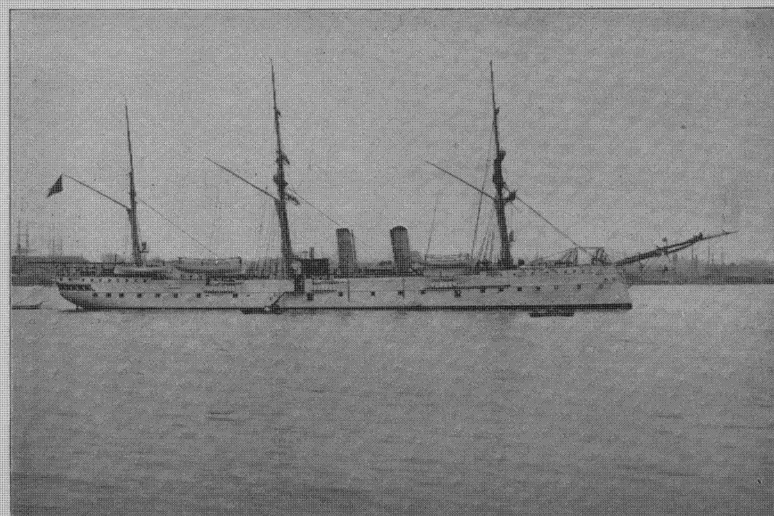
Then he goes up and expectorates on a large shell for good luck, or, as a yell is heard, "Armor-piercing, quick," and the shells are quickly changed, he takes an old oil rag and rubs the cap of the projectile, saying: "That'll make you bite better." The young boy of the new navy, who has been in the service as many months as the old salt has years, exclaims to his shipmates:

"Ah! what's he givin' us?"

That was the routine of the handling-room on the 3d of July, except that once in a while the rush was broken by a carelessly-handled shell dropping. Fortunately it didn't explode.

TEMPERATURE OVER 160 DEGREES.

Down beneath the protective deck, informed of the glories of that day's fighting only by Captain Cook's bulletin through the speaking-tube, men worked in a pit below the water in a temperature of over 160 degrees. From the funnels the black smoke pouring forth told that stokers, coal-passers and firemen were working like fiends to give the ship more momentum, so that the foe would be captured. At the engines Engineer Carter and his assistant, Mr. Patton, watched every pul-



Speed, 20 Knots. CRISTOBAL COLON (Spanish Armo:ed Cruiser).

sation and encouraged the men to greater efforts to produce more steam. In the stoke holds men toiled amid the fierce flames that licked out at them each time the doors opened for coal or the long slice bars went in.

CHAPTER XXXVIII.

SPAIN'S FIGHTING SHIPS.

COMPILED MAINLY FROM A "LIST OF THE BATTLESHIPS, CRUISERS AND TORPEDO-BOATS OF THE SPANISH NAVY," PREPARED IN THE MILITARY INFORMATION DIVISION AT WASHINGTON.

Spain has but two war vessels that are rated in the class of battleships, the Vitoria and the Pelayo, and the former is a "broadside" of antiquated model, used as a training-ship heretofore, but understood to be undergoing equipment with 5.5-inch rapid-fire guns for war service. She is an old iron vessel of 7250 tons displacement, 318 feet 3 inches long, 55 feet 10 inches beam, and a maximum draught of 25 feet 3 inches. She has a 5.5-inch armor belt, and her speed is 11 knots. Her normal coal supply is 875 tons, and her complement of men 561.

The Pelayo is a rather powerful battleship of steel, of 9900 tons displacement, 330 feet long, 66 feet beam, 24 feet 11 inches draught. She carries an armor belt 17.75 inches thick, increasing to 19.25 about the barbette in which her guns are mounted, and has a 4-inch steel defensive deck. Her armament consists of two 12.5-inch and two 11-inch heavy ordnance, one 6.2-inch and twelve 4.7-inch guns, six smaller rapid-fire and twelve machine guns, and she has seven torpedo tubes. Her speed is 16 knots, coal supply 800 tons, complement 600 men.

There is another old broadside iron ship, the Numancia, of about the same size and power as the Vitoria, which is reported to be receiving new machinery and new armament in 6.2-inch and 4.7-inch rapid-fire guns. She has been classed rather as a port-defense vessel than a battleship, and can make only 8 knots.

But Spain is pretty strong in first-class armored cruisers. The Emperador Carlos V is a formidable vessel of 9235 tons displacement, 380 feet long with a ram bow, 67 feet beam and

25 feet draught, and her speed is 20 knots. Her armor belt consists of only two inches of Harvey steel, except about the gun turrets, which are placed one forward and one aft, and there the armor is ten inches thick. Each turret carries a big 11-inch Hontoria gun, and the rest of the armament consists of eight 5.5-inch rapid-fire guns, four 3.9-inch, two 2.7-inch, four 2.2-inch and six machine guns. There are six torpedo tubes; the coal capacity of the vessel is 1200 tons, and the complement of men 535.

There are six other modern armored cruisers of 7000 and one of 6840 tons. To three of these, the Cardenal Cisneros, Cataluna and Princesa de Asturias, the same description applies. Each is 347 feet 10 inches long, 61 feet beam and 21 feet 10 inches draught, has a 12-inch armor belt, reduced to 10.5 at the gun position, which is "central battery," and a two-inch steel protective deck. The speed is 20 knots, and the armament consists of two 11-inch guns (turrets fore and aft), ten 5.5-inch rapid-fire, two 2.7-inch, four 2.2-inch, four 1.4-inch and two machine guns. Each has also eight torpedo tubes, carries a coal supply of 1200 tons and has 500 officers and men.

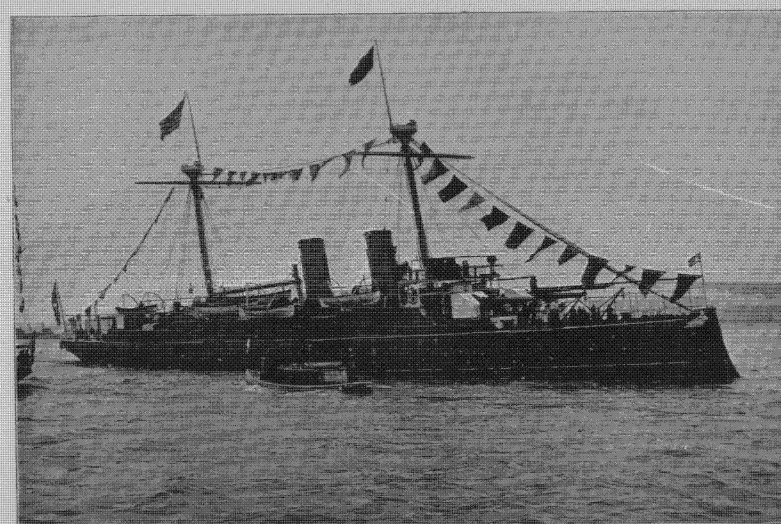
The other three, 7000 tons, are the Almirante Oquendo, the Infanta Maria Teresa, and the Vizcaya, and answer to the same description, except that the Infanta Maria Teresa has slightly exceeded the speed of 20 knots with which the others are credited. Each is 340 feet long, 65 feet beam and 21 feet 6 inches draught. The armor belt is 12 inches, except around the gun position (central battery), where it is 10.5 inches, and the steel deck is three inches thick. The armament of the Almirante Oquendo consists of two 11-inch guns (turrets fore and aft), ten 5.5-inch Hontoria, eight 2.2-inch and eight 1.4-inch rapid-fire and two machine guns. That of the Infanta Maria Teresa differs from this only in having both the 11-inch and the 5.5-inch guns of the Hontoria type, and that of the Vizcaya only in having 5.5-inch guns, as well as those of small caliber of the rapid-fire type. Practically the three are of equal power, and each carries a coal supply of 1200 tons, and a complement of 500 men. The Cristobal Colon, 6840 tons, is slightly smaller and less heavily armed, but has the same speed. Her length is 328 feet, beam 59 feet 8 inches, draught

24. She has only six inches of armor plate and a 1.5-inch protective deck. Her two large guns are 10 inch, and mounted in barbettes, one forward and one aft. The rest of her armament consists of ten 6-inch rapid-fire guns, six 4.7-inch, ten 2.2-inch, ten 1.4-inch and two machine guns. She has four torpedo tubes, coal supply of 1000 tons, complement 450 men.

These include all of Spain's fighting ships of the first class, but she has several second-class cruisers. The largest of these, the Alfonso XIII, might fairly be rated first class, as she displaces 5000 tons and has a speed of 20 knots. She is 318 feet 6 inches long, 50 feet 6 inches beam, 20 feet draught, and is protected with a 4.5-inch steel deck over engines and machinery. Her armament consists of four 7.8-inch Hontoria guns, six 4.7-inch, six 2.2-inch, six 1.4-inch rapid-fire and three machine guns. She has five torpedo tubes, can carry 1200 tons of coal and is manned by 276 officers and seamen.

Next to her is the Lepanto, 4826 tons, 318 feet 6 inches long, 50 feet 6 inches beam, 20 feet draught, protected by 4.75-inch steel deck; speed, 20 knots. Her armament is four 7.8-inch Hontorias, six 4.7-inch rapid-fire, six 6-pounders, four 3-pounders and five Maxims. She has five torpedo tubes, carries 1100 tons of coal and 276 men.

The unarmored and unprotected steel cruiser Reina Christiana is of 3520 tons displacement, 282 feet 2 inches long, 42 feet 7 inches beam, 16 feet 5 inches draught and has a speed of 17.5 knots. She is armed with six 6.2-inch Hontoria guns, two 2.7-inch, three 2.2-inch, two 1.5-inch rapid-fire, six 3-pounders and two machine guns. She has five torpedo tubes; coal capacity, 600 tons; complement of men, 375. Of a similar type, but of 3342 tons displacement, are the Aragon, Castilla and Navarra. The last named differs slightly in model from the other two. The Aragon and Castilla are each 246 feet long, 45 feet 11 inches beam and 20 feet 11 inches draught, have a speed of 14 knots, a coal supply of 470 tons, and 300 men. The Navarra differs in these items only in being 13 feet 1 inch shorter, 3 feet 4 inches less beam and 7 inches less draught. The armament of the Aragon is six 6.2-inch Hontoria, two 3.3-inch Krupp, four 2.9-inch and two machine guns; that of the Castilla four 5.9-inch Krupp, two 4.7-



REINA REGENTA (Spanish Unprotected Cruiser)

inch, two 3.3-inch and four 2.9-inch, eight rapid-fire and two machine guns; the Navarra four 5.9-inch, two 4.7-inch, two 3.4-inch, four 2.9-inch and four machine guns. Each vessel has two torpedo tubes.

The next in size are the Alfonso XII and the Reina Mercedes, each of 3090 tons. Length, 278 feet 10 inches; beam, 42 feet 7 inches; draught, 16 feet 5 inches; speed, 17.5 knots; coal supply, 600 tons; complement, 300 men. Each has five torpedo tubes, but their armaments differ. The Alfonso XII carries six 6.2-inch Hontoria, two 2.7-inch and six 6-pounder rapid-fire, four 3-pounder and five machine guns. The Reina Mercedes has six 6.2-inch Hontoria, two 2.7-inch, three 2.2-inch rapid-fire, two 1.5-inch, six 1.4-inch and two machine guns.

Of other Spanish cruisers, the largest is the Velasco, 1152 tons, 209 feet 11 inches long, 29 feet 3 inches beam, 12 feet 5 inches draught; speed, 14.3 knots; coal supply, 220 tons; complement, 173 men. She is armed with three 5.9-inch Armstrong guns, two 2.7-inch Hontorias and two machine guns. There are five cruisers of 1130 tons each—the Conde de Venadito, Don Antonio de Ulloa, Don Juan de Austria, Infanta Isabel and Isabel II. The description answers precisely for all except in details of armament. Each is 210 feet long, 32 feet beam and 12 feet 6 inches draught; has a speed of 14 knots, a coal supply of 220 tons, and 130 men. The armament of the Conde de Venadito is four 4.7-inch Hontoria guns, two 2.7-inch, two rapid-fire and five machine guns. The others are substantially the same in power. There are also three cruisers of 1030 tons each—the Isla de Cuba, Isla de Luzon and the Marques de Ensenada. Each is 185 feet long, 30 feet beam and 11 feet 6 inches draught. The first two named have a speed of 16 knots and the last 15; each can carry 160 tons of coal, and the Isla de Cuba and Isla de Luzon have 160 and the Marques de Ensenada 164 men. The armament of each of the first two is four 4.7-inch Hontoria, four 6-pounder rapid-fire, two 3-pounder and two machine guns, and that of the latter four 4.7-inch Hontoria, five rapid-fire and four machine guns. The former have three and the latter four torpedo tubes.

This exhausts the list of cruisers proper, though there are two others so called, the Quiros and Villabolos, each 315 tons, for service in the Philippines. There is an old wooden sloop of war of 935 tons which carries three 4.7-inch Hontoria, two 2.8-inch Krupp and two machine guns.

The Don Alvaro de Bezan, 830 tons and 235 feet long; Dona Maria de Molina, same size; Destructor, 458 tons, 192 feet 6 inches long; Filipinas, 750 tons, 213 feet; Galicia, 571 tons, 190 feet; Marques de la Vitoria, 830 tons, 235 feet; Marques de Molina, 571 tons, 190 feet; Martin Alonzo Pinzon, same size; Nueva Espana, 630 tons, 190 feet; Rapido, 570 tons, 190 feet; Temerario, 590 tons, 190 feet, and the Vincente Yanez Pinzon, 571 tons, 190 feet, are classed as torpedo-gunboats. They carry from two to four torpedo tubes and have a speed of 19 or 20 knots. The armament of the largest consists of two 4.7-inch rapid-fire guns, four 1.5-inch and two machine guns. The General Concha, 520 tons, is listed as a gunboat, and the Elcano, 524 tons, General Lego, 524 tons, Magellanes, 524 tons, as "gun-vessels." There are two dispatch vessels in the list, identical in description, the Fernando el Catolico (used as a torpedo training-ship), and the Marques del Duero, 500 tons displacement, 157 feet 5 inches long and 25 feet 7 inches beam, with a speed of 10 knots.

There is a supplementary list of gunboats "for service in Cuban waters"—the Hernan Cortes, 300 tons, one 5.12-inch Parrott gun, 12 knots; Pizarro, 300 tons, two 2.95-inch rapid-fire Nordenfeldt guns, 12 knots; Vasco Nunez de Balboa, 300 tons, one 2.95-inch Nordenfeldt gun, 12.5 knots; Diego Velasquez, 200 tons, two 2.24-inch rapid-fire Nordenfeldt guns, and one 1-pounder revolving cannon; Ponce de Leon, in all respects like the last; Alvarado, 100 tons, one 2.24-inch rapid-fire Nordenfeldt, and one revolving cannon; Sandoval, mate to the last. There are also eighteen small steel gunboats for service in Cuba, carrying each one 6-pounder Maxim-Nordenfeldt rapid-fire gun and one 1-pounder Maxim-Nordenfeldt automatic.

The list of Spain's torpedo-boat-destroyers comprises six vessels—the Audaz, which is a formidable craft of 400 tons displacement and a length of 225 feet, carrying two 12-pounders,

two 6-pounders, and two 1-pounders, besides two torpedo tubes, and capable of a speed of 30 knots, and the Furor, Terror, Osado, Pluton and Proserpina, each of which is of 380 tons displacement, 220 feet long, capable of 28 knots, and carrying two 14-pounder and two 6-pounder rapid-fire and two 37-mm. automatic guns, all Maxim-Nordenfeldt. Each of these vessels carries 100 tons of coal and has 67 men.

The rest of the torpedo fleet consists of boats ranging from 147 feet 5 inches to 43 feet 4 inches in length, and from 108 to 23 tons displacement. The names, with indication of length in feet and speed in knots, are Ariete, 147.5 feet, 26.1 knots; Rayo, 147.5 feet, 25.5 knots; Azor, 134.5 feet, 24 knots; Halcon, 134.5 feet, 24 knots; Habana, 127.5 feet, 21.3 knots; Barcelo, 126 feet, 19.5 knots; Orion, 125 feet, 21.5 knots; Retamosa, 118 feet, 20.5 knots; Julia Ordonez, 117.7 feet, 20.1 knots; Ejercito, 111.5 feet, 25 knots; Rigel, 105 feet, 19 knots; Pollux, 80 feet, 19.5 knots; Castor, 76.2 feet, 19 knots; Aire, 43.4 feet, 8 knots, and four vidette-boats, 60 feet long, making 18.3 knots. These four boats have a light armament, besides their two (in two cases three) torpedo tubes, and, with the exception of the smallest, carry from thirteen to twenty-five tons of coal, and require from eighteen to twenty-four men to manage them.

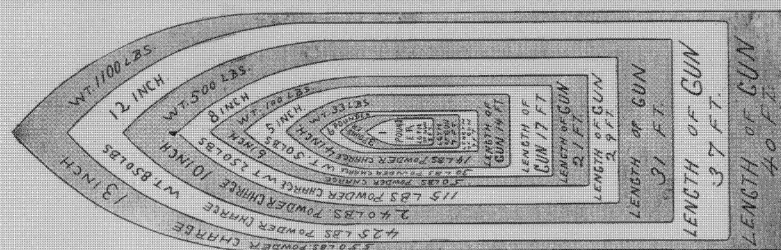
Spain has now in process of building one battleship of 10,000 tons, one armored cruiser of 10,500 tons and one of 6840 tons (Pedro d'Aragon); two protected cruisers—Reina Regente, 5372 tons, and Rio de la Plata, 1775 tons; one torpedo-gunboat, 750 tons, and four torpedo-boats of the Ariete type. She can also command for arming as cruisers thirteen vessels of the Compania Transatlantica of Cadiz, as follows, in order of size, with tonnage and speed indicated: Magellanes, 6932 tons, 17 knots; Buenos Aires, 5195 tons, 14 knots; Montevideo, 5096 tons, 14.5 knots; Alfonso XII, 5063 tons, 15 knots; Leon XIII, 4687 tons, 15 knots; P. de Satrustegui, 4638 tons, 15 knots; Alfonso XIII, 4381 tons, 16 knots; Reina Maria Christina, 4381 tons, 16 knots; Isla de Luzon, 4252 tons, 13 knots; Isla de Mindanao, 4195 tons, 13.5 knots; Isla de Panay, 3636 tons, 13.5 knots; Cataluna, 3488 tons, 14 knots; Ciudad de Cadiz, 3084 tons, 13.5 knots.

The effective naval strength of Spain may be summed up

from the foregoing detailed description. She has but one really effective battleship, the Pelayo, which cannot be ready to leave her coast for some time. She has one powerful cruiser in the Carlos V (not immediately available), and seven others which stand high in the first class in all respects. These eight strong and fast cruisers embody her chief fighting forces on the water; but there are eight others, ranging in size from 3000 to 5000 tons, and most of them having a speed of 17 knots or more, which could render effective aid in harassing an enemy. There are nine of the smaller cruisers of a little more than 1000 tons displacement.

The torpedo-gunboats are strong and speedy craft, and they are twelve in number, in addition to which there are one other gunboat, three "gun-vessels" and two dispatch-boats, besides the three 300-ton, two 200-ton, two 100-ton and eighteen "small" gunboats especially "for service in Cuban waters."

Spain's torpedo fleet is a strong one. It contains six exceptionally powerful and swift torpedo-boat-destroyers, ten torpedo-boats rated as first class according to the English standard, two of the second class, and seven others—twenty-five in all.



A comprehensive idea may be obtained from the picture, which represents one-seventh size, of the relative weights and sizes of the guns and shells used on the vessels of the United States Navy. Of the 13-inch guns there are four each in the main battery of the Indiana, Massachusetts and Oregon, and there will be four of them on each of the new vessels, the Kearsarge, Kentucky, Alabama, Illinois and Wisconsin. Of the 12-inch guns, there are four in the main battery of the Iowa, two on the Texas, four on the Puritan and two on the Monterey. There are four of the 10-inch guns in the main battery of the Amphitrite, Miantonomah, Monadnock and Terror, and two in the Monterey. The Indiana, Massachusetts, Oregon, Iowa and Brooklyn have eight of the 8-inch guns each, the New York six, Baltimore four, Olympia four, Boston and Charleston two each, and the Columbia and Minneapolis one each. The 8-inch shells were the largest used at the battle of Manila bay. The 4-inch are the largest on 14 small gunboats. Of the 6-inch guns, the Texas, Baltimore, Boston, Charleston, Bennington, Concord and Yorktown have six each; Newark, Philadelphia and San Francisco, 12 each; Indiana, Massachusetts, Oregon and Petrel, 4 each; Columbia and Minneapolis, 2 each, and the Cincinnati and Raleigh, 1 each. The Brooklyn has 12 of the 5-inch guns, the Cincinnati, Olympia, Raleigh, Detroit, Marblehead and Montgomery, 10 each. The New York has 12 of the 4-inch guns, the Columbia and Minneapolis 8 each, the Iowa and Puritan 6 each, the Amphitrite and Monadnock 2 each. Solid projectiles are now rarely used, all shells containing explosive charges of wet gun cotton. The charges given are for brown prismatic powder, the weight of the smokeless powder charges being about half as much. The length of the guns and the weight of the charge are shown by the figures on the illustration. For instance, the 13-inch gun is 40 feet long. It throws a projectile weighing 1100 pounds, and takes a powder charge of 550 pounds.

CHAPTER XXXIX.

A BATTLESHIP.

THE KIND OF MACHINERY CONTAINED IN THE U. S. S. MASSACHUSETTS.

The Massachusetts, to the unprofessional mind, is more of a vast and complicated machine than it is a ship. She carries no less than eighty-six steam engines, four dynamos, hydraulic machines for hoisting, pneumatic machines for charging the automobile torpedoes and for ventilating the ship, an ice machine and a condenser, and electric machines for hoisting and lighting.

We read in history of the terrible broadsides delivered from the 100-gun line-of-battle ships of the first half of this century. Lord Nelson might have pounded such a ship as the Massachusetts all day long with his entire broadside without injuring her much more than she would be injured by a hailstorm, while one well-directed shot from the 13-inch turret would have demolished any ship then afloat.

THE TURRETS.

There are on the Massachusetts six turrets. Two of these turrets, one to the fore and the other aft of the middle of the ship, contain the 13-inch guns. These guns, four in number, are almost the most terrific engines of destruction upon any ship afloat. The turrets in which they are inclosed are made of steel as hard as steel can be made, eighteen inches in thickness. Their shape makes it most likely that a shell striking one of them would glance off and inflict no damage. The turrets extend far down into the interior of the ship. They are worked each by a special steam engine and are controlled by the officer in the turret, who can move the structure, guns and all, around by working a lever. Thus he can point the guns to any direction except toward the middle of the ship.

GUNS AND AMMUNITION.

The guns themselves are thirty-six feet long and project out of the turrets far over the decks. This great length is necessary to get the full force of the powder, which is slow in burning. The shell used is thirteen inches in diameter. It is conical at the extremity and several feet long, and made of hard steel. It weighs 1250 pounds, and the powder which propels it weighs half as much. The weight of a projectile used in a gun can be ascertained approximately by taking the cube of the diameter of the bore and dividing it by two. The ammunition for the big guns is stored far down in the ship under the turret. There is a hydraulic lift containing three cylinders. In one of these the projectile is placed and the powder in the other two. The powder is of the brown, hexagonal kind, and one charge is divided and sewed into two serge bags. From the bottom of the turret the charge is shot up to the breech of the guns and rammed home into the guns by a hydraulic rammer.

THE RANGE.

In theory a gun can shoot one mile for each inch of its caliber. Thus a 13-inch gun is supposed to shoot thirteen miles, a 10-inch gun ten miles, and so on. But in a ship this cannot be done, because it is impossible to get the necessary elevation. One-half the theoretical distance is nearer the mark.

The other turrets of the Massachusetts, four in number, contain 8-inch guns. They are elevated above the big turrets and between them and the smokestacks.

If it were possible to fire continuously and at the same time all the guns of the ship the effect would be tremendous. Each minute one shot would come from the 13-inch turrets and six from the 8-inch turrets and the four 6-inch guns would be working in proportion, while a hailstorm of steel would come from the twenty 6-pounder rapid-fire guns, the six 1-pounder and the four machine guns.

QUARTERS OF THE CREW.

The protected deck of the ship is almost level with the water. Above this the ship is unarmored. The comparatively light steel plates of which the sides are constructed are perforated with port holes admitting light and air into the various messrooms, offices and staterooms of the senior officers. The steel floors of this and the apartments on the deck below are carpeted with lineoleum. The ceilings are steel and the walls are of the same metal, painted white, with here and there a portiere over a door. On the deck under the protected armor the junior officers have their staterooms and the crew their sleeping and living quarters. These are lighted by electricity and ventilated by blowers. There are no outside openings, but the quarters are fairly comfortable. There are washrooms and bathrooms, and in each stateroom there is a writing-desk and some other little furniture.

On this deck also is a prison, which is a small room, lighted and ventilated through a perforated door. Going through the interior of the ship is almost like going through a succession of burglar-proof safes. The doors, many of them, are like the safe doors, and upon the collision signal being sounded, which is the "siren," or fog horn, and certain rattles, all these doors must be closed, and when closed water cannot pass from one compartment to another.

As all of our battleships are nearly alike in every respect the foregoing description of the Massachusetts will apply equally to the others.

CHAPTER XL.

WARSHIP GLOSSARY.

DEFINITIONS OF THE VARIOUS TERMS USED ON BOARD A MAN-OF-WAR.

A.

AMIDSHIPS.—The middle part of the ship, whether in regard to her length or breadth.

AMMUNITION.—The powder and shot and shell for use in the guns.

ANCHOR WATCH.—A small number of men kept on duty at night, while the ship is at anchor in port, to be ready for anything which may suddenly turn up.

ARM AND AWAY.—The order for the small boats of a ship to prepare for service.

ARDOIS SYSTEM.—Electric signal lights carried on a stay from a masthead and made to show a series of red or white lights.

ARMAMENT.—A term expressing collectively all the guns of a ship.

ARMOR.—The metal protection given to a ship.

ATHWART.—Transversely; at right angles to the keel.

ARMOR INCLINED.—A perpendicular belt running diagonally on board for a short distance at the forward and after ends of the belt.

B.

BACKING.—The timber to which the armor plates are bolted.

BARBETTE.—A fixed circular belt of armor rigidly attached to the deck, protecting the turret, which revolves inside. The guns fire over it. Guns are mounted in barbette when they fire over a parapet and not through port holes.

GENERAL JOSE MACEO.

BASE.—The rear portion of a shot or gun.

BATTERY.—The place where guns are mounted. A number of guns taken collectively.

BATTLE LANTERN.—A lantern supplied for lighting up the decks during an engagement.

BATTLESHIP.—A ship carrying heaviest guns and thickest armor to stand the brunt of a naval engagement.

BERTH DECK.—The deck next below the lower gun deck.

BETWEEN DECKS.—The space comprised between any two decks.

BILGE.—That part of the hull more nearly horizontal than vertical.

BILGE KEEL.—A projection on the bilge of a vessel parallel with keel.

BOW CHASER.—A gun mounted in the bow to fire on retreating vessel.

BREECH.—The portion of the gun abaft the chamber.

BREECH BLOCK.—A mass of metal used to close breech of gun.

BRIDGE.—A platform extending across the deck above the rail for the convenience of the officers in charge.

BULKHEAD.—Any partition separating apartments on the same deck.

BUNKER.—A bin for storing coal on ship.

C.

CABLE.—A long, strong chain used to retain a ship in place at anchor.

CAPSTAN.—A machine used on board ship for raising heavy weights.

CARTRIDGE.—A case containing a charge of powder for a gun. Cartridges for great guns are usually put up in serge cloth bags; those for rapid-firers are put up in copper cylinders.

CHAMBER.—That part of the bore of a gun which receives the powder.

CONNING TOWER.—The armored tower forward where the wheel, engine telegraphs, etc., are placed, and where the captain is supposed to go to direct the fighting of his ship in time of action.

CONVOY.—A merchant fleet protected by an armed force. The ships which defend the merchant vessels while en voyage.

CROSS-TREES.—The short arms extending across the topmast.

CROWN.—The round-up of the deck from the level line.

CROW'S NEST.—A perch for a lookout at the masthead.

CRUISER.—A type just below the battleship and just above the gunboat. An armored cruiser has side or vertical armor and horizontal or deck armor. A protected cruiser has horizontal or deck armor only. An unprotected cruiser has no armor.

D.

DEAD FLAT.—The name of the widest frame of the ship.

DEAD LIGHTS.—Coverings to the side air ports.

DEPTH OF HOLD.—The perpendicular height from the top of the ceiling to the top of the main deck.

DINGHEY.—The smallest boat on a warship; also "dinghy" and "dingy."

DISPLACEMENT.—The weight in tons of the volume of water the hull of a ship displaces.

DRAUGHT.—The depth of the keel of a ship below the surface of the water; spelled also draft.

E, F.

ENSIGN.—The national flag; also the lowest grade of commissioned officers in the navy.

FALSE KEEL.—A plank bolted to the main keel so that when a ship touches bottom the false keel will be injured and not the main keel.

FATHOM.—A measure of six feet.

FIRST WATCH.—The watch from 8 to 12 midnight.

FLUSH DECK.—A deck from stem to stern without a break.

FORE FOOT.—The forward end of the keel.

FORE ORLOP.—That part of the ship next forward of the hold and under the berth deck.

FOREPEAK.—The extreme forward hold of the ship where the paintroom and other storerooms are.

FRAMES.—The several ribs which compose the frame of a ship. The floor plate angle irons and reverse angle irons when completed form a rib.

FUNNEL.—The large pipe for carrying off the smoke, called often smokestack or smokepipe.

FUSE.—The local apparatus for inflaming the charge of a shell or torpedo.

G.

GANGWAY.—A thoroughfare. The aperture in the ship's side where people enter and depart.

GREAT GUNS.—The heavy ordnance of a ship. All guns above six-inch caliber are styled great guns; below that guns are now usually called rapid-firers or rapid-fire guns.

GUN.—A generic term for the pieces composing the armament of a ship.

GUNBOAT.—A small vessel usually under 2000 tons displacement, with gun power developed rather than speed or coal-carrying capacity.

H.

HALF-MAST.—To lower a flag midway between the truck and the deck.

HATCH.—An aperture in the deck more than two feet square; when smaller they are usually called manholes.

HOLD.—The interior portion of a ship below the lower deck.

HOWITZER.—A short, light cannon, to throw a large projectile with a small charge of powder.

HULL.—The body of a ship, independent of masts and rigging.

J, K, L.

JACOB'S LADDER.—Short ladder, with wood rungs and rope sides.

KEEL.—The bottom plate of a ship, extending from stem to stern; the frames are bolted to it.

KEELSON.—The inside keel of the ship.

LAUNCH.—Usually the largest boats in the ship, steam or pulling.

LINE OF FIRE.—The line of the prolongation of the bore of a gun when fired.

LIST.—To lean to one side or the other.

M, N, O, P.

MACHINE GUNS.—Those in which the operations pertaining to continuous fire are automatically performed by machinery. Cartridges are supplied to the chamber, fired, the empty case withdrawn and a fresh cartridge inserted.

MONITOR.—A low freeboard armored vessel, with one or two turrets, each carrying two great guns; nearly flat bottom and with very light draft of water, designed by Ericsson.

ORDNANCE.—The science of making and mounting guns.

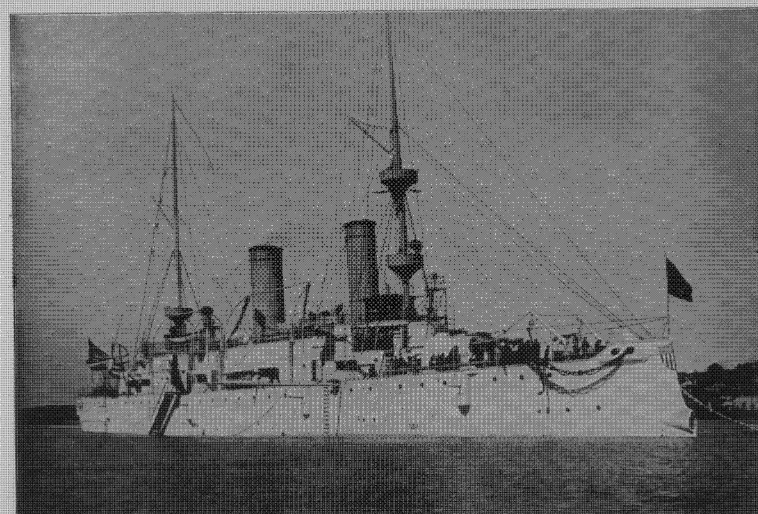
ORLOP.—The lowest deck, where the cables and storerooms usually are.

PENNANT.—A narrow flag, "coach whip," hoisted by all vessels in commission commanded by an officer not of flag rank.

PLATFORM DECK.—The upper part of the protective deck.

PRIVATEER.—A private armed vessel commissioned by the government in time of war to prey upon an enemy's commerce.

PROTECTIVE DECK.—The armored deck, curved, protecting the vitals and extending from the ram to the stern.



Speed. 20 Knots. OLYMPIA (Protected Cruiser). Cost. $1,796,000.

Q, R.

QUARTER-DECK.—The upper deck, abaft the mainmast.

QUARTERMASTER.—In the navy a petty officer who has charge of the steering of the ship and assists the navigator; he has charge of the logs, leads, colors, signal gear, etc.

QUARTERS.—The stations of the officers and men at the guns for working them when in action.

RAPID-FIRE GUNS.—Those for which cartridge and projectile are made up as one whole.

RATE.—In our navy a classification of ships according to displacement tonnage. Above 5000 tons, first rate; 3000 to 5000, second rate; 1000 to 3000, third rate; below 1000, fourth rate.

REDOUBT.—An armored space in the center of the ship protecting the turret mounts and ammunition.

S.

SIDE.—The side of a ship includes all the outside upper works down to the water edge.

SKIN.—The inside or outside plating of a ship.

SMALL ARMS.—Firearms carried in the hand.

SQUADRON.—A detachment of vessels employed on any service.

SQUADRON, FLYING.—A squadron of observation that cruises rapidly from place to place.

SPARDECK.—The upper deck on which the turrets are placed.

STARBOARD.—The right-hand side, looking forward.

STARBOARD STRAKE.—The first range of plating in the ship's bottom next the keel.

CHAPTER XLI.

BATTLE OF MANILA.

GRAPHIC DESCRIPTION OF DEWEY'S TRIUMPHANT CONFLICT—THE SPANISH SQUADRON SUCCUMBED TO THE TERRIFIC FIRE OF THE WELL-AIMED AMERICAN GUNS AND THE BATTLE CRY WAS "REMEMBER THE MAINE"—THE EIGHT WOUNDED AMERICANS—INCIDENTS OF THE WORLD-FAMOUS CONFLICT.

From special dispatches and Associated Press reports of Commodore Dewey's famous fight and remarkable victory in Manila bay, it is learned that on Monday, April 25, after receiving news of the declaration of war, the fleet quitted British waters and on Wednesday sailed for Manila at the fastest speed that could be made with the coal supply provided for the ships. On Saturday night it passed the batteries at the entrance of Manila bay and on Sunday morning the battle began.

ENTERING THE BAY.

In the words of a special correspondent, who stood beside Commodore Dewey on the bridge of the flagship Olympia during the engagement, with all its lights out the squadron steamed into Bocagrande on Saturday night with crews at the guns. This was the order of the squadron, which was kept during the whole time of the first battle: The flagship Olympia, the Baltimore, the Raleigh, the Petrel, the Concord, the Boston.

It was just 8 o'clock, a bright moonlight night, but the flagship passed Corregidor Island without a sign being given that the Spaniards were aware of its approach.

Not until the flagship was a mile beyond Corregidor was a gun fired. Then one heavy shot went screaming over the Ra-

leigh and the Olympia, followed by a second, which fell further astern.

The Raleigh, the Concord and the Boston replied, the Concord's shells exploding apparently exactly inside the shore battery, which fired no more.

The squadron slowed down to barely steerage way and the men were allowed to sleep alongside their guns.

Commodore Dewey had timed the arrival so that the fleet were within five miles of the city of Manila at daybreak.

THE SPANISH SQUADRON.

Off Cavite the Spanish squadron was sighted. Admiral Montejon commanding, whose flag was flying on the 3500-ton protected cruiser Reina Christina. The protected cruiser Castilla, of 3200 tons, was moored ahead, and astern to the port battery and to seaward were the cruisers Don Juan de Austria, Don Antonio de Ulloa, Isla de Cuba, Isla de Luzon, Quiros, Marquis del Onero and General Lezox. These ships and the flagship remained under way during most of the action.

UNDER THE STARS AND STRIPES.

"With the United States flag flying at all their mastheads," writes the correspondent, "our ships moved to the attack in line ahead, with a speed of eight knots, first passing in front of Manila, where the action was begun by three batteries mounting guns powerful enough to send a shell over us at a distance of five miles.

"The Concord's guns boomed out a reply to these batteries with two shots. No more were fired, because Commodore Dewey could not engage with these batteries without sending death and destruction into the crowded city.

"As we neared Cavite two very powerful submarine mines were exploded ahead of the flagship. This was at 5.06 o'clock.

"The Spaniards evidently had misjudged our position. Immense volumes of water were thrown high in the air by these destroyers, but no harm was done to our ships.

"No other mines exploded, however, and it is believed that the Spaniards had only these two in place.

REMEMBERED THE MAINE.

"Only a few minutes later the shore battery at Cavite Point sent over the flagship a shot that nearly hit the battery in Manila, but soon the guns got a better range and the shells began to strike near us or burst close aboard from both the batteries and the Spanish vessels.

"The heat was intense. Men stripped off all clothing except their trousers.

"As the Olympia drew nearer all was as silent on board as if the ship had been empty, except for the whirr of blowers and the throb of the engines.

"Suddenly a shell burst directly over us.

"From the boatswain's mate at the after five-inch gun came a hoarse cry. 'Remember the Maine,' arose from the throats of 500 men at the guns.

"This watchword was caught up in turrets and firerooms wherever seaman or fireman stood at his post.

" 'Remember the Maine!' had rung out for defiance and revenge. Its utterance seemed unpremeditated, but was evidently in every man's mind, and, now that the moment had come to make adequate reply to the murder of the Maine's crew, every man shouted what was in his heart.

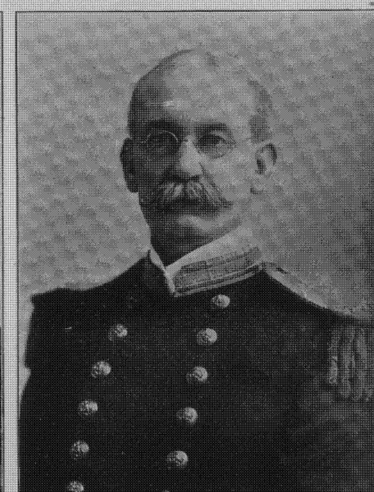
READY TO BEGIN.

"The Olympia was now ready to begin the fight.

"Commodore Dewey, his chief of staff, Commodore Lamberton, an aide and myself, with Executive Officer Lieutenant Rees and Navigator Lieutenant Calkins, who conned ship most admirably, were on the forward bridge. Captain Gridley was in the conning tower, as it was thought unsafe to risk losing all the senior officers by one shell.

" 'You may fire when ready, Gridley,' said the Commodore, and at nineteen minutes of 6 o'clock, at a distance of 5500

COMMODORE DEWEY.



CAPTAIN SIGSBEE.

yards, the starboard eight-inch gun in the forward turret roared forth a compliment to the Spanish forts.

"Presently similar guns from the Baltimore and the Boston sent 250-pound shells hurling toward the Castilla and the Reina Christina for accuracy.

"The Spaniards seemed encouraged to fire faster, knowing exactly our distance, while we had to guess their. Their ship and shore guns were making things hot for us."

"OPEN WITH ALL GUNS."

A number of incidents of narrow escapes from death occurred during the battle, at one time a shell passing under Commodore Dewey and gouging a hole in the deck. Changing his course to a distance of 4000 yards, Commodore Dewey finally issued the order to "Open with all guns," and soon all the vessels were hard at work. The result of this fierce cannonade is described by the Associated Press correspondent, who says:

"By this time the Spanish ships were in a desperate condition. The flagship Reina Christina was riddled with shot and shell, one of her steam pipes had burst and she was believed to be on fire. The Castilla was certainly on fire, and soon afterward their condition became worse and worse, until they were eventually burned to the water's edge.

"The Don Antonio de Ulloa made a most magnificent show of desperate bravery. When her commander found she was so torn by the American shells that he could not keep her afloat, he nailed her colors to the mast, and she sank with all hands fighting to the last. Her hull was completely riddled and her upper deck had been swept clean by the awful fire of the American guns, but the Spaniards, though their vessels were sinking beneath them, continued working the guns on her lower deck until she sank beneath the waters.

FATE OF A TORPEDO-BOAT.

"During the engagement a Spanish torpedo-boat crept along

the shore and round the offing, in an attempt to attack the American store ships, but she was promptly discovered, was driven ashore, and was actually shot to pieces.

"The Mindanao had, in the meanwhile, been run ashore to save her from sinking, and the Spanish small craft had sought shelter from the steel storm behind the breakwater.

THE FINISHING TOUCHES.

"The battle, which was started at about 5.30 A. M., and adjourned at 8.30 A. M., was resumed about noon, when Commodore Dewey started in to put the finishing touches to his glorious work. There was not much fight left in the Spaniards by that time, and at 2 P. M. the Petrel and Concord had shot the Cavite batteries into silence, leaving them heaps of ruins and floating the white flag.

"The Spanish gunboats were then scuttled, the arsenal was on fire and the explosion of a Spanish magazine caused further mortality among the defenders of Spain on shore.

"On the water the burning, sunken or destroyed Spanish vessels could be seen, while only the cruiser Baltimore had suffered in any way from the fire of the enemy. A shot which struck her exploded some ammunition near one of her guns and slightly injured a half-dozen of the crew."

AFTER THE ACTION.

At the end of the action Commodore Dewey anchored his fleet in the bay before Manila, and sent a message to the Governor-General, General Augusti, announcing the inauguration of the blockade, and adding that if a shot was fired against his ships he would destroy every battery about Manila.

The position occupied by the Spaniards, the support which their ships received from the land batteries, and the big guns they had on shore gave them an enormous advantage. Therefore, when it is considered that the Spaniards lost over 600 men in killed and wounded, that all their ships, amounting to about fourteen, were destroyed, and that their naval arsenal at

Cavite was also destroyed, with its defences, it will become apparent that the victory of the American Commodore is one of the most complete and wonderful achievements in the history of naval warfare.

Not a man on the American fleet was killed, not a ship was damaged to any extent, and only eight men were injured slightly on board the Baltimore.

THE SPANISH LOSS.

The losses of the Spaniards include ten warships, several torpedo-boats, two transports, navy-yard and nine batteries. Including the losses ashore, about 1200 Spaniards were killed or wounded.

The estimated value of the Spanish property destroyed or captured is $6,000,000. On the American side the total loss is eight men wounded and $5000 damage to the ships.

THE AMERICANS WOUNDED.

The eight wounded men of the Baltimore are Lieut. Frank Woodruff Kellogg, of Waterbury, Conn., aged 41; Ensign Noble Edward Irwin, of Greenfield, Ohio, aged 29; Coxswain Michael John Buddinger, of Manitowoc, Wis.; Landsman Robert L. Bartow, of Bartow, Minn., aged 25; Seaman Richard P. Covert, of Racine, Wis., aged 28; Seaman William O'Keefe, of Newark, N. J., aged 30; Seaman Rosario Ricciardelli, born in Italy but a naturalized American, aged 24, and Coxswain Edward Snelgrove, of Ellensburg, Wash., aged 24.

From Admiral Dewey's statement, taken in connection with the press reports, the officials of the Navy Department are satisfied that none of these officers or men are seriously injured. They gather from the accounts that the explosion of ammunition, which is supposed to have caused most of the injuries, was confined to one small box or chest of the fixed ammunition that is put up for six-pounder guns and kept beside the gun whenever the ship is cleared for action.

ACTION OF THE FLEET.

On Monday following the battle the American forces occupied the Spanish navy-yard at Manila, blew up six batteries at the entrance of the bay, cut the cable, established a blockade of Manila and drove the Spanish forces out of Cavite. Tuesday and Wednesday the lower bay and entrance were swept for torpedoes, and the crews were given a well-earned rest, while the Admiral prepared his dispatches.

INCIDENTS OF THE FIGHT.

During the engagement Sunday one shot struck the Baltimore and passed clean through her, fortunately hitting no one. Another ripped up her main deck, disabled a six-inch gun and exploded a box of three-pounder ammunition, wounding eight men.

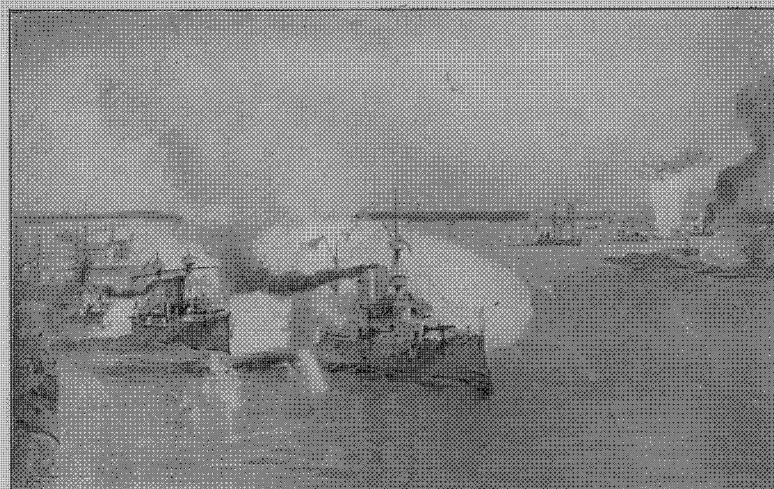
The Olympia was struck abreast the gun in the ward room by a shell, which burst outside, doing little damage.

The signal halyards were cut from Lieutenant Brumby's hand on the after bridge. A shell entered the Boston's port quarter and burst in Ensign Dodridge's stateroom, starting a hot fire, and fire was also caused by a shell which burst in the port hammock netting. Both these fires were quickly put out.

Another shell passed through the Boston's foremast, just in front of Captain Wildes, on the bridge.

COMMODORE DEWEY—HE SMELLED POWDER IN THE CIVIL WAR AND HAS HAD A VARIED CAREER IN THE NAVY.

Commodore Dewey was born in Vermont sixty-one years ago, and entered the navy when he was seventeen years of age. On graduation from the Naval Academy in 1858 he was ordered to the steam frigate Wabash, of the European squadron, for a cruise which lasted until 1859. Commissioned a lieutenant April 19, 1861, he was attached to the Mississippi, of the West Gulf squadron, from 1861 to 1863, taking part in the capture of New Orleans in 1862, and the battle at Port Hudson in



BATTLE OF MANILA

July, 1863. The Mississippi was destroyed in this action, being struck 250 times in a short time. Lieutenant Dewey was also in a gunboat fight at Donaldsonville soon afterward, and the next year was on the Agawam, of the North Atlantic blockading squadron, taking part in both attacks on Fort Fisher.

Made a lieutenant-commander March 3, 1865, he was in turn the executive officer of the Kearsarge and the Colorado, of the European squadron, and was given his first command—that of the Narragansett—on special duty, in 1871, at the unusually early age of thirty-three. As commander he was again appointed to the Narragansett, doing three years of deep-sea surveying in the Pacific.

He did lighthouse duty from 1876 to 1882, and commanded the Juniata, of the Asiatic squadron, in 1882-1883. He became captain in 1884 and was the first commander of the Dolphin, the first ship of the new navy. His last previous sea command was that of the Pensacola on the European station, 1885-1888.

From 1889 to 1893 he was in charge of the Navy Department bureau of equipment and recruiting. He was put in charge of the Asiatic squadron January 1 of this year, having become a commodore February 28, 1896.

CHAPTER XLII.

MESSES IN THE NAVY.

HOW THE TABLE OF THE OFFICERS ON A MAN-OF-WAR IS PROVIDED WITH EATABLES—ON THE CO-OPERATIVE PLAN—ONE OFFICER IS ELECTED AS THE MESS HOUSEKEEPER.

The caterer's first duty after collecting the assessments is to buy a three months' stock of all articles necessary for the table. The cooks, stewards and boys are under his immediate orders, and he occupies about the same position on board ship as the chairman of the house committee does in his club.

When he enters upon the discharge of his duties he usually calls on the officers of the mess for an advance of not less than $100 each. In the navy an officer receives only his pay, and out of that he must "find" himself, so that when a new officer joins a ship one of the first things he has to do is to contribute to the mess fund. If he has to draw this amount from the pay department in advance—as he usually does, because the average seafaring man does not carry $100 bills around with him—he can draw no pay until the debt to the pay department has been liquidated.

Having his fund, the caterer makes out his list of supplies for his twenty-five or thirty comrades, buys at the lowest figure and does his best to satisfy his mess. Some men have natural talent in that direction and are successful caterers, while others make a sorry business of it and are roundly criticized for their poor housekeeping.

The tablecloths and table ornaments belong to the mess, but each man owns his own napkin, and when an officer has guests the extra napkins are taken from his personal store. From the money which is collected by the caterer he is expected to feed the cook, stewards and boys. These people are

all entitled to "stores" or rations, but they do not draw them, and the equivalent in money is drawn for them and is deposited in the mess fund, and in some cases becomes their extra fee, or tip, for services rendered to the mess.

When the officers' mess is spoken of it does not mean all the officers aboard ship, because the captain messes alone and never honors the other officers with his presence at their table except on festive or official occasions. He furnishes his own mess and, except for his clerk, takes his meals alone. On board of a flagship the admiral and captain mess together. The wardroom mess includes the officers from lieutenant-commander to junior lieutenant, inclusive of both line and staff, and the officers of the marine corps.

VARIOUS MESSES.

The steerage mess, which is arranged on the same plan as the wardroom mess and subject to the same rules, includes the cadets and officers of the rank of ensign. This mess is usually just forward of the wardroom.

Another mess is known as the warrant officers' mess. This includes the gunner, boatswain, sailmaker and carpenter.

The chief petty officers' mess includes the chief machinist, ship's writer, apothecary and sometimes the gunner's mate. The wardroom mess costs each of its members from $30 to $40 a month, the steerage mess is run on a less elaborate scale and costs about $20 to $25, and the warrant officers' mess costs still less.

The bills are rendered monthly and are easily made out, because the whole amount expended by the caterer is divided by the number constituting the mess, and each man pays his share. But this includes only the table proper and has nothing to do with wine, cigars and extra luxuries, which may be purchased from what is known as the "wine mess," which any of the officers may join. Wine is charged to the individual who orders it at an advance of 10 per cent. on the original cost, and the officers who belong to the wine mess, who have advanced the money for the purchase of the article, divide the profits, if there be any.

Visitors on board who are entertained in the wardroom rarely know that their meal is paid for by the wardroom mess, and that the wine is charged direct to their host. In some instances the whole mess bears the expense, but in no case does the government pay a cent.

TELEGRAPH MESS.

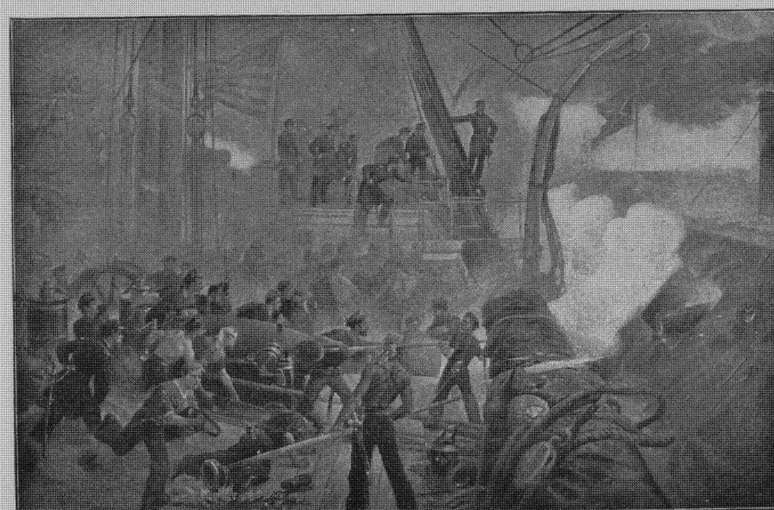
On board ship there are all sorts of messes, which are really clubs organized for the purpose of saving money. In addition to those mentioned, there are newspaper messes, cigar messes, and when a ship leaves on a three-years' cruise it usually has a cable-code mess. By means of this cable-code mess the officers keep their friends informed of their movements at a comparatively small outlay. By arrangement code words are sent to some person, usually the wife of one of the officers, and she in turn repeats the message, translated into English, to each of the families of the officers belonging to the mess.

"Thus," an officer relates, "I remember that we sent a cable message from Japan once which contained only two words, but cost about $9. The message was important to the families of our mess, because it informed them that we were safe and well. The message was sent to the various addresses and it cost us each less than $1."

These expense-saving organizations are necessary when one takes into consideration the fact that the officer in the navy has heavy expenses and comparatively small pay. He must have his own bed linen and blankets and towels, and must be provided with all in such quantities that he may not run short on a long cruise.

AN OFFICER'S OUTFIT.

An officer usually carries about two dozen pairs of white trousers, six or eight white coats, five dozen white shirts and underwear, socks and handkerchiefs in proportion. He has a light serge suit and a light cloth suit for summer wear, and



BATTLE OF MOBILE BAY (CIVIL WAR), IN WHICH DEWEY WAS ENGAGED.

is usually provided with the following additional articles of wearing apparel:

Evening dress coat	$45 00
Evening dress waistcoat	8 00
Evening dress trousers	22 00
Special dress coat	85 00
Chapeau	20 00
Epaulets	40 00
White duck cap skeleton	2 50
Cloth cap	7 00
Belts	14 00
Sword, sword knot, etc	18 00
Overcoat	50 00
Shoulder straps	4 00
Waterproof coat	15 00

All this is a part of a junior officer's outfit. Officers of higher rank are required to have more elaborate and expensive uniforms. Officers in the navy usually give directions to the pay department to send a certain amount of their pay to their homes every month. This is known as the "allotment," and must be taken into consideration when the officer makes his mess calculation.

The pay is small, the expenses are great, and in many instances where liberal hospitality is dispensed in the wardroom, while every man is the embodiment of hospitality and openhandedness, somebody ashore, many miles away, who is dearer to the officer than the casual friend for a day whom he is helping to entertain, will be short just the amount which falls to the account of the officer.

The annual pay of officers in the navy is:

Ensign	$1,200
Lieutenant, junior grade	1,800
Lieutenant, senior grade	2,400
Lieutenant-commander	2,800
Commander	3,500
Captain	4,500
Commodore	5,000
Rear-admiral	6,000

The government allows all officers thirty cents a day in lieu of rations. This was formerly divided into two parts—twenty-five cents in rations proper and five cents for liquor. When the liquor ration was abolished in 1863 the five cents was added to the regular ration allowance for every person, officer or enlisted man, in the navy.

CHAPTER XLIII.

NAVAL BATTLE AT SANTIAGO.

CERVERA MADE A GREAT EFFORT, BUT IN TWO HOURS HIS FLEET WAS WRECKED—RIDDLED WITH SHELLS—HEAVY ARMOR, TOO, WAS PERFORATED WITH PROJECTILES FROM AMERICAN GUNS.

Magnificent beyond description was the bold dash by which Cervera attempted to get his fleet out of Santiago harbor. Cervera himself led the way with his flagship, the Cristobal Colon. It was to be a dash to liberty or to death, and the Spanish admiral made the plunge with eyes open.

Sunday quiet rested over the entrance to Santiago harbor. No signs of life were visible about old Morro. Beyond and toward the city of Santiago all was still. After two days of fighting the armies of both nations were resting in their trenches. Off this way, for half a dozen miles from shore, most of the vessels of Admiral Sampson's fleet lay lazily at anchor.

Admiral Sampson had set out in the morning to dislodge the Spanish from their works at Aguadores, where the Michigan troops were repulsed along the line of railway Saturday morning while they were marching westward to seize the Morro battery and blow up the fort. The American torpedo-boats were not with the fleet. When Admiral Sampson left the Morro the battleships and the cruiser Brooklyn were grouped off the harbor mouth.

COLON DARTED OUT FIRST.

It is not known whether Admiral Cervera blew up the Merrimac or passed it in single column. The Cristobal Colon first glided out of the harbor and shot to the westward. Her two funnels and high, black bulwarks showed plain against the

green of the hills, her pennant and the Spanish red and yellow ensign waving above.

In a few seconds the American fleet was in motion, the Indiana, which was closest, heading straight in shore to get close range. The Spaniards opened fire with an 11-inch Hontoria gun, and mighty fountains of water rose above the battleship and wet her decks. The shell fell near her bow.

The Indiana replied with her 13-inch guns, and a moment later let go everything she could bring to bear.

One of the first shells fell on the Spanish cruiser's deck. Cervera was then going past, and the Indiana rounded to give him a broadside. As the Iowa and the Texas opened fire the Almirante Oquendo was just coming into view in the harbor mouth.

At first one could hardly believe his eyes, but when the Oquendo appeared and steamed swiftly westward into the smoke, where Cervera's flag still flew, it flashed upon those on the American fleet that here was to be history-making indeed. It was a sublime spectacle of a desperate admiral, who had decided to give battle against overwhelming odds in the open water rather than remain and blow up his own ships in the harbor of the beleaguered city.

SPANISH FIRED BROADSIDES.

Cervera's flag was hidden for a time as he fled westward, his port broadside emitting flashes of flame, which marked his progress. For the next five minutes he ran a gauntlet such as few ships had ever run in history.

The Indiana fell on the Oquendo, paying no heed to the Morro battery, whose gunners tried hard to protect the cruiser as she moved to the westward. The Iowa let Cervera go on into the hands of the Oregon, Massachusetts and Brooklyn, and then turned, with the Texas, to pound the Oquendo. Soon every American ship in the vicinity was in action. Smoke shrouded the coast and blew away lazily, revealing geysers about the ships where the Spanish shells from the cruisers and the Morro tore the water.

STREET SCENE, SANTIAGO.

Another ship emerged from the harbor. It was the Vizcaya, coming at full speed, smoke curling over her bow as she took her course to the westward and brought her bow guns into play.

Next came the Infanta Maria Teresa and Spain's two dreaded torpedo-boat destroyers, perhaps 200 yards apart. The Maria Teresa was received with a terrific storm of shells. Smashed and on fire she was beached close to the Morro.

AMERICAN STRATEGY

The Iowa steamed for a time forward with the Oquendo and the Indiana did the same with the Vizcaya. As the fight thus moved westward it became clear that the Americans were willing that the Spanish ships should run far enough from the Morro to lose the aid of the guns there, and in twenty minutes this was done.

Both the Oquendo and the Vizcaya were sometimes within 1000 yards of the Indiana. The range varied, but, as a rule, it was short and extremely deadly. Nevertheless, the high speed and thick armor of their class stood the Spanish ships in good stead as they followed in the path of honor marked out by Admiral Cervera.

Three-quarters of an hour after the action began it was evident that the Spanish had many guns disabled and would have to surrender. There were terrible casualties on the enemy's ships. As the smoke cleared a little one could see the Spanish flagship, her port broadside spouting smoke, still holding on to the westward.

The Texas and the Massachusetts joined the Indiana and the Iowa. The Oquendo and the Vizcaya hugged the shore and steamed after Cervera on the Colon, to go with him to defeat and death.

SHIPS SET ON FIRE.

Shells burst on the decks of the Spanish cruisers at short intervals. Often the ships were on fire, but again and again

their crews extinguished the flames and manned again and again the guns from which they had been driven.

The green coast smoked with the shells which flew over them, and crashing sounds heard amid the thunder of great rifles told of armor-piercing shells driven into and through the protected sides of Cervera's ships. Still they fired. Their shots fell about the Indiana and Iowa thickly.

GREAT WORK OF THE GLOUCESTER.

Lieutenant-Commander Wainwright, of the Gloucester, like Nelson, seemed to have a blind eye. If he were signalled to pull out, he remained, with his six-pounders, to do work which was both heroic and astonishing. At one time the Gloucester was being fired at by the Vizcaya, both torpedo-boat destroyers and the Morro battery. That she was not sunk and that she had enough men left to work her guns was marvelous.

She lay close in to where the Vizcaya came out, and ran along parallel, firing at the cruiser as fiercely in proportion to her size as did the Indiana and Iowa. Captain Eulate, of the Vizcaya, probably feared a torpedo from the Gloucester, for he turned loose his secondary battery at her as he passed on into a storm of shells from the battleships.

Then the destroyers came on, and the Gloucester accepted them at once as parts of her contract. These destroyers were strong in machine guns and guns of the three and six-pounder class. It seemed that smoke jets burst from them in twenty places as they slipped along after the Vizcaya. The water all about the Gloucester was kept splashing by shells and by bullets from machine guns. But the yacht steamed ahead, keeping the destroyers directly between her and the shore and hammering them. The Morro was throwing shells from behind, and occasionally the Vizcaya turned a gun or two to aid her followers.

In ten minutes the fire of the destroyers slackened, but, although some of their guns were disabled, their machinery

was all right, and they moved on until Morro could no longer take part in the battle.

THE NEW YORK TAKES PART.

Then the New York appeared, having been summoned to return from Aguadores. She was six miles away when the destroyers saw her. The Morro thundered at Sampson as he came within range, but the Admiral never heeded, seeing only in the distance the dim forms of the Vizcaya and the Oquendo, hopelessly hemmed in by a circle of fire, and in the foreground the Gloucester, fighting two destroyers at short range.

When the destroyers saw the flagship they sped away from the Gloucester and tried to overtake the Vizcaya and get into shelter on her starboard side. If that could not be done there ought to be a chance to torpedo the Indiana and break through our line to the open sea, where speed would save them, but the Indiana steamed in shore and the Iowa went further away.

The Indiana's secondary battery had the first destroyer's range, and rained shells upon her. Splintered and torn, but still with their steering gear and machinery intact, both destroyers turned back to run for the mouth of the harbor and seek safety inside, but it was too late. The fight had been carried nearly four miles west of the Morro, and the New York was already past the harbor mouth.

The Gloucester was ready for the destroyers close at hand. She and the destroyers and the Indiana formed a triangle of which the destroyers were the apex, and the American fire, converging, was too fierce for human beings to withstand.

A CARNIVAL OF DESTRUCTION.

One destroyer drifted into the surf of fire a battered wreck, and then crept on toward the Gloucester and the New York, with her guns silent and showing a flag of truce. She was on nre, and her crew ran her ashore to save the lives of those who had escaped the shells. She blew up soon after they abandoned her.

The Spanish admiral was lost in smoke to the westward, when the Oquendo went ashore, with flames bursting from her decks. The Iowa, Indiana, Texas and Massachusetts ceased firing, the Massachusetts going to join the Oregon and the Brooklyn in hunting up and smashing Cervera's ship.

Once headed off the Oquendo turned into a small bay four or five miles west of Santiago, where she lay close to the land. With an ever-weakening broadside the Vizcaya followed, first heading out as if to break through the line of battle. The Indiana and Iowa closed in, and their formation made her escape in that direction impossible.

Captain Eulate then attempted to reach the east side of the bay, occupied by the Oquendo, but in vain. The Vizcaya's bulwarks near the stern had been torn away. Smoke poured out where shells had exploded inside, and she was on fire. Her guns, with the exception of those forward, were out of action. Her bow guns were still fired at intervals. Those who were not working the bow guns crowded forward to escape the smoke and fire aft.

The Oquendo was soon ashore, her guns silent and smoke rising in thick, black clouds from her.

There was a thundering of guns to the westward now, and flashes told that Cervera still fought, but to the eastward of his ship lay the burning wrecks of his two destroyers.

The torpedo-boat Ericcson was seen coming along with the New York. The Indiana and the Iowa were closing in, and shell after shell burst above and aboard the Vizcaya. Eulate hoisted a white flag as his ship went ashore to save the remnant of his men. Simultaneously up went a flag of white on the Oquendo, and down came the flag of Spain.

BUT ONE SHIP LEFT.

An hour and one-half had elapsed since Cervera left the harbor, and of the vessels which came out only his flagship was still in action.

Cervera passed the bay in which the Oquendo had sought refuge and held on a due westward course close to the land, but

evidently nourishing the desperate hope that he might break through the line and reach free water. He had passed in succession the Indiana, the Iowa and the Texas, not to speak of the little Gloucester, which spouted six-pounder shells at him. Since his flag had appeared outside the harbor his ship had been struck again and again. By this time the Vizcaya and the Oquendo were beaten, but in spite of the 12 and 13-inch shells that were rained upon him at a range which was short for such guns, in spite of the fact that his boilers and machinery were damaged, he held his course. From a point a mile west of the Morro the Cristobal Colon was invisible frequently in low-hanging smoke from her own guns and also that which drifted in shore from the battleships.

CERVERA HEADED OFF.

At half-past 11 o'clock Cervera saw the Oregon coming in shore ahead of him to round him to. The smoke was very thick. The firing was incessant.

Cervera's available guns were no longer well served. Shells had set fire to his ship near the stem, and the flames were controlled with difficulty, but the Spanish admiral altered his course and headed off from the coast, as if to attempt to pass between the ships and run for it.

It was impossible. The Iowa and the Texas were already moving down to close the gap, and the Spanish flagship, raked by the Oregon and the Brooklyn at from 1000 to 3000 yards, and by the Iowa and the Texas at longer range, turned in shore again and ran for the rocks, where the surf was breaking. Cervera still replied occasionally.

FLAGSHIP IN A BLAZE.

But his ship moved slowly now, as if disabled, and in a few minutes more his guns were silent. Black smoke replaced the swirling white. The flagship was aflame. Her men had been unable either to work the guns or smother the flames caused by bursting shells, and she was headed for the rocks.

She struck bow on and rested there. Red flames burst through the black smoke, and soon a pillar of cloud rose straight up 1000 feet and then bent against the green mountain.

Cervera's ship was hopelessly lost. The American battleships ceased firing before she struck, and ran in, apparently with the intention of saving the survivors as prisoners. This was evidently expected by the Spaniards, hundreds of whom thronged the forward deck, watching the flames eating their way toward them. These were taken prisoners.

INCIDENTS OF THE BATTLE.

VIZCAYA'S AWFUL PLIGHT.

Captain Usher, of the Ericcson, made a hard run to get a shot at the Vizcaya, but a white flag was floating over Captain Eulate's vessel when the Ericcson came up. "The American shells had torn holes through the Vizcaya's 12-inch plates," said Captain Usher afterward, "and through them I could see naked men, bloody and gashed, roasting in the shell of the boat. Her guns had been left shotted and were going off by themselves from heat, but by care we were able to get alongside.

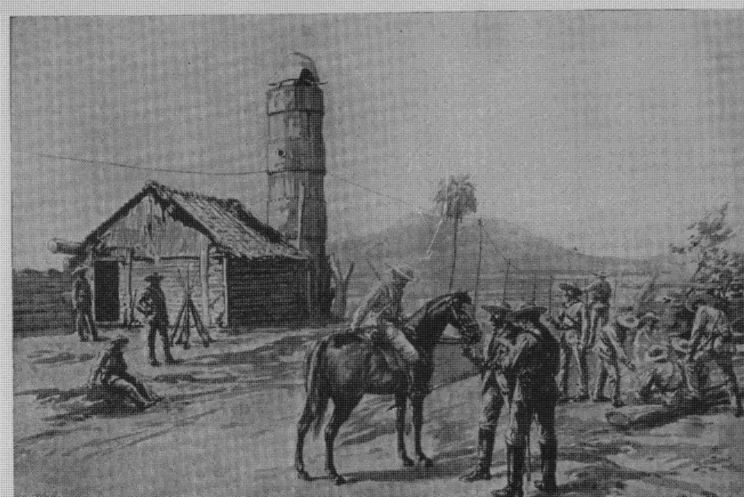
"Her decks and sides were almost red-hot. Two men were climbing down a davit tackle, and, as the ship rolled, they would swing against her scorching side, then swing back and out again.

"I took 110 men off the Vizcaya, all as naked as when they were born. I know of no worse sight than naked men, with bleeding wounds exposed. One swam toward me. 'Are you also an officer?' I asked. 'No,' he answered; 'only a mournful soldier.'"

QUICK WORK BY THE FLEET.

The following was written by a naval officer on the battleship Iowa:

A little after three bells in the forenoon watch the inspection



A SPANISH ADVANCED POST, OUTSIDE REMEDIOS

of our ship had been concluded, and as the officer of the watch was relieving the navigating officer he heard a quick cry to call the captain, followed by a shout:

"There come the Spaniards out of the harbor!"

The trained eye of the alert officer had marked the thin trail of drifting smoke, and before the signals, "Clear ship for action," had been given the bows of the Spanish vessels, rushing in "line ahead," were seen darting around Zocapa point for the open sea.

In a moment all was bustle and trained energy. Men rushed to their quarters, guns were trained, and in less than twenty seconds the whistling shriek of a rapid-fire gun warned the startled fleet of the hot work awaiting. In two minutes every gun on shipboard was cast loose, manned, loaded and ready for the long-expected signal to fire.

At the yardarm of our battleship a string of signal flags warned the fleet that the enemy was trying to escape, but even before the answering pennants of the other ships announced their understanding of the message every vessels was dashing to the stations long before allotted for the emergency which had come at last.

It was a splendid spectacle. The Spaniards, with bottled steam, cleared the harbor's mouth, seemingly in a moment. Under their eager prows a column of foam whitened the long billows and their bubbling wakes left a furrow as sharp as a racing yacht making a winning run for the finish line. Their course was shaped for the westward, but as fast as they sped in their desperate break for freedom, faster flew the shells of the pursuing Americans.

The first heavy shell from the Iowa's battery fell short, and then by a mischance so did the second, but afterward the rain of shot fell surely and unsparingly upon the fleeing foe.

Not a whit behind in this eager fusilade roared the batteries of the Spanish ships. Their port broadsides flamed, but it was more a splendid display of fireworks than a successful effort to damage the targets of our ships.

In fifteen minutes after they were discovered the four Spanish armored cruisers had cleared the wide entrance, and five

minutes later the torpedo-boat destroyers, hugging the beach and seeking the sheltering broadsides of their sister ships, flew into the turmoil of the action. At this time every gun of the American squadron that could be brought to bear was pumping projectiles into the enemy.

In an instant, it almost seemed, a ship of the Vizcaya class burst into flames, caused, undoubtedly, by a long, sure shot from the Oregon or the Texas. A minute later a 12-inch projectile struck the flagship Maria Teresa near her after-smokepipe. A tremendous explosion followed. Then she was shrouded in smoke and was lighted with lurid flames; and when the powder cloud blew down she was seen helm hard aport rushing for the beach.

Twenty-five minutes after the first ship had been sighted half the Spanish fleet had surrendered or was on fire. The remainder of the battle was easy.

COMMANDER OF THE IOWA TELLS OF CERVERA'S DESTRUCTION.

Captain Evans's account of the battle, as told in the cabin of the Iowa to a correspondent of the Associated Press, is intensely interesting. He said:

"At the time 'general quarters' was sounded the engine bell rang full speed ahead, and I put the helm to starboard and the Iowa crossed the bows of the Infanta Maria Teresa, the first ship out. As the Spanish admiral swung to the westward the 12-inch shells from the forward turret of the Iowa seemed to strike him fair in the bow, and the fight was a spectacle.

"As the squadron came out in column, the ships beautifully spaced as to distance, and gradually increasing their speed to their thirteen knots, it was superb.

"The Iowa, from this moment, kept up a steady fire from her heavy guns, heading all the time to keep the Infanta Maria Teresa on her starboard bow and hoping to ram one of the leading ships.

"In the meantime, the Oregon, Indiana, Brooklyn and Texas were doing excellent work with their heavy guns.

"In a very short space of time the enemy's ships were all

clear of the harbor mouth, and it became evidently impossible for the Iowa to ram either the first or the second ship on account of their speed.

A BROADSIDE AT 2000 YARDS.

"The range at this time was 2000 yards from the leading ship. The Iowa's helm was immediately put hard to the starboard and the entire starboard broadside was poured into the Infanta Maria Teresa. The helm was then quickly shifted to port and the ship headed across the stern of the Teresa in an effort to head off the Oquendo. All the time the engines were driving at full speed ahead. A perfect torrent of shells from the enemy passed over the smokestacks and superstructure of the ship, but none struck her.

"The Cristobal Colon, being much faster than the rest of the Spanish ships, passed rapidly to the front in an effort to escape. In passing the Iowa the Colon placed two six-inch shells fairly in our starboard bow. One passed through the cofferdam and dispensary, wrecking the latter and bursting on the berth deck, doing considerable damage. The other passed through the side at the water-line with the cofferdam, where it still remains.

"As it was now obviously impossible to ram any of the Spanish ships on account of their superior speed, the Iowa's helm was put to the starboard and she ran on a course parallel with the enemy.

TERRIFIC PUNISHMENT OF THE OQUENDO.

"Being then abreast of the Almirante Oquendo, at a distance of 1100 yards, the Iowa's entire battery, including the rapid-fire guns, was opened on the Oquendo. The punishment was terrific. Many twelve and 8-inch shells were seen to explode inside of her, and smoke came out through her hatches. Two 12-inch shells from the Iowa pierced the Almirante Oquendo at the same moment, one forward and the other aft. The Oquendo seemed to stop her engines for a moment and

lost headway, but she immediately resumed her speed and gradually drew ahead of the Iowa and came under the terrific fire of the Oregon and Texas.

RECKONING WITH THE TORPEDO-BOATS.

"At this moment the alarm of 'torpedo-boats' was sounded, and two torpedo-boat destroyers were discovered in the starboard quarters at a distance of 4000 yards. Fire was at once opened on them with the after-battery, and a 12-inch shell cut the stern of one destroyer squarely off. As the shell struck a torpedo-boat fired back at the battleship, sending a shell within a few feet of my head. I said to Executive Officer Rogers, 'That little chap has got a lot of cheek.' Rogers shouted back, 'She shoots very well, all the same.'

"Well among the advancing cruisers, spitting shots at one and then at another, was the little Gloucester, shooting first at a cruiser and then at a torpedo-boat and hitting a head wherever she saw it. The marvel was that she was not destroyed by the rain c. shells.

THE VIZCAYA GETS HER DOSE.

"In the meantime the Vizcaya was slowly drawing abeam of the Iowa, and for the space of fifteen minutes it was give and take between the two ships. The Vizcaya fired rapidly but wildly, not one shot taking effect on the Iowa, while the shells from the Iowa were tearing great rents in the sides of the Vizcaya. As the latter passed ahead of the Iowa she came under the murderous fire of the Oregon. At this time the Infanta Maria Teresa and the Almirante Oquendo, leading the enemy's column, were seen to be heading for the beach and in flames. The Texas, Oregon and Iowa pounded them unmercifully. They ceased to reply to the fire, and in a few minutes the Spanish cruisers were a mass of flames and on the rocks with their colors down, the Teresa flying a white flag at the fore.

"The crews of the enemy's ships stripped themselves and began jumping overboard, and one of the smaller magazines began to explode.

"Meanwhile the Brooklyn and the Cristobal Colon were exchanging compliments in a likely fashion at apparently long range, and the Oregon, with her locomotive speed, was hanging well on the Colon and also paying attention to the Vizcaya.

"The Teresa and the Oquendo were in flames on the beach just twenty minutes after the first shot was fired. Fifty minutes after the first shot was fired the Vizcaya put her helm to port, with a great burst of flame from the after part of the ship, and headed slowly for the rocks at Aserradero, where she found her last resting place.

THE END OF THE VIZCAYA.

"As it was apparent that the Iowa could not possibly catch the Cristobal Colon, and that the Oregon and Brooklyn undoubtedly would, and as the fast New York was also on her trail, I decided that the calls of humanity should be answered and attention given to the 1200 or 1500 Spanish officers and men who had struck their colors to the American squadron commanded by Admiral Sampson.

"I, therefore, headed for the wreck of the Vizcaya, now burning furiously fore and aft. When I was in as far as the depth of water would admit I lowered all my boats and sent them at once to the assistance of the unfortunate men, who were being drowned by dozens or roasted on the decks.

"I soon discovered that the insurgent Cubans from the shore were shooting on men who were struggling in the water after having surrendered to us. I immediately put a stop to this, but I could not put a stop to the mutilation of many bodies by the sharks inside the reef.

"These creatures had become excited by the blood from the wounded mixing in the water.

PRAISE FOR HIS BRAVE CREW.

"My boat's crews worked manfully and succeeded in saving many of the wounded from the burning ship.

"One man who will be recommended for promotion clambered up the side of the Vizcaya and saved three men from burning to death. The smaller magazines of the Vizcaya were exploding with magnificent cloud effects. The boats were coming alongside in a steady string, and willing hands were helping the lacerated Spanish officers and sailors on to the Iowa's quarterdeck. All the Spaniards were absolutely without clothes. Some had their legs torn off by fragments of shells. Others were mutilated in every conceivable way.

"The bottoms of the boats held two or three inches of blood. In many cases dead men were lying in the blood. Five poor chaps died on the way to the ship. They were afterward buried with military honors from the Iowa. Some examples of heroism, or, more properly, devotion to discipline and duty, could never be surpassed. One man on the lost Vizcaya had his left arm almost shot off just below the shoulder. The fragments were hanging by a small piece of skin; but he climbed unassisted over the side and saluted as if on a visit of ceremony. Immediately after him came a strong, hearty sailor, whose left leg had been shot off above the knee. He was hoisted on board the Iowa with a tackle, but never a whimper came from him. Gradually the mangled bodies and naked well men accumulated until it would have been most difficult to recognize it as a United States battleship.

CAPTAIN EULATE IN TEARS.

"Blood was all over her usually white quarterdeck, and 272 naked men were being supplied with water and food by those who a few minutes before had been using a rapid-fire gun on them. Finally came two boats with Captain Eulate, commander of the Vizcaya, for whom a chair was lowered over the side, as he was evidently wounded. The captain's guard of marines was drawn up on the quarterdeck to salute him, and

I stood waiting to welcome him. As the chair was placed on the deck the marines presented arms. Captain Eulate slowly raised himself in the chair, saluted me with grave dignity, unbuckled his sword-belt, and, holding the hilt of the sword before him, kissed it reverently, with tears in his eyes, and then surrendered it to me.

HIS FAREWELL TO HIS SHIP.

"Of course, I declined to receive his sword, and, as the crew of the Iowa saw this they cheered like wild men. As I started to take Captain Eulate into the cabin to let the doctors examine his wounds the magazine on board the Vizcaya exploded with a tremendous burst of flame. Captain Eulate, extending his hands, said: 'Adios, Vizcaya. There goes my beautiful ship, Captain,' and so we passed on to the cabin, where the doctors dressed his three wounds. In the meantime thirty officers of the Vizcaya had been picked up, besides 272 of her crew. Our wardroom and steerage officers gave up their staterooms and furnished food, clothing and tobacco to those named officers from the Vizcaya. The paymaster issued uniforms to the naked sailors, and each was given all the corned beef, coffee and hardtack he could eat. The war had assumed another aspect.

"As I knew the crews of the first two ships wrecked had not been visited by any of our vessels, I ran down to them. I found the Gloucester, with Admiral Cervera and a number of his officers aboard, and also a large number of wounded, some in a frightfully mangled condition. Many prisoners had been killed on shore by the fire of the Cubans. The Harvard came off, and I requested Captain Cotton to go in and take off the crews of the Infanta Maria Teresa and the Almirante Oquendo, and by midnight the Harvard had 976 prisoners aboard, a great number of them wounded.

NO PARALLEL TO CERVERA'S COURAGE.

"For courage and dash there is no parallel in history to this action of the Spanish admiral. He came, as he knew, to abso-

lute destruction. There was one single hope—that was that the Cristobal Colon would steam faster than the Brooklyn. The spectacle of the two torpedo-boat destroyers, paper-shells at best, deliberately steaming out in broad daylight in the face of the fire of a battleship, can only be described in one way—it was Spanish and it was ordered by Blanco. The same must be said of the entire movement.

"In contrast to this Spanish fashion was the cool, deliberate Yankee work. The American squadron was without sentiment apparently. The ships went at their Spanish opponents and literally tore them to pieces. But the moment the Spanish flag came down it must have been evident that the sentiment was among the Americans, not among the Spaniards.

EVERY INCH AN ADMIRAL.

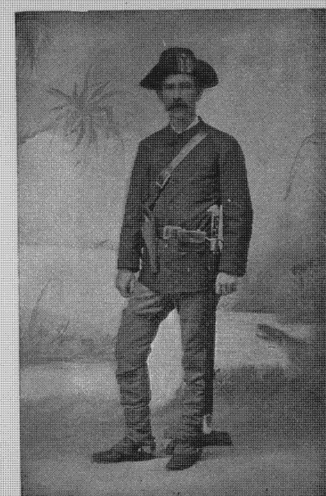
"I took Admiral Cervera aboard the Iowa from the Gloucester, which had rescued him from the dead, and received him with a full admiral's guard. The crew of the Iowa crowded aft over the turrets, half-naked and black with powder, as Cervera stepped over the side bare-headed. Over his undershirt he wore a thick suit of flannel, borrowed from Lieutenant-Commander Wainwright of the Gloucester. The crew cheered vociferously. Cervera is every inch an admiral, even if he had not any hat. He submitted to the fortunes of war with a grace that proclaimed him a thoroughbred."

Captain Evans is intensely proud of his ship and her men. The Iowa fired thirty-one 12-inch, forty-eight eight-inch, 270 four-inch, 1060 six-pound and 120 one-pound shots.

FEARFUL HAVOC ON THE VIZCAYA.

The officers of the Vizcaya said they simply could not hold their crews at the guns on account of the rapid fire poured upon them. The decks were flooded with water from the fire hose, and blood from the wounded made this a dark red. Fragments of bodies floated in this along the gun deck. Every instant the crack of exploding shells told of new havoc. One of the 12-

A CUBAN WOMAN SOLDIER



A CUBAN SOLDIER.

inch shells from the Iowa exploded a torpedo in the Vizcaya's bow, blowing twenty-one men against the deck above and dropping them dead and mangled into the fire which at once started below.

The torpedo-boat Ericsson was sent by the flagship to the help of the Iowa in the rescue of the Vizcaya's crew. Her men saw a terrible sight. The flames leaped out from the huge shot-holes in the Vizcaya's sides, licked up the decks, sizzling the flesh of the wounded, who were lying there shrieking for help. Between the frequent explosions there came awful cries and groans from the men pinned in below. This carnage was chiefly due to the rapidity of the American's fire. Corporal Smith, of the Iowa, fired 135 aimed shots in fifty minutes from a four-inch gun. Two shells struck within ten feet of Smith and started a small fire, but the corporal went on pumping shots into the enemy, only stopping to say, "They've got it in for this gun, sir."

MAGNIFICENT COURAGE OF OUR GUNNERS.

From two six-pounders 440 shots were fired in fifty minutes. Up in the tops the marines banged away with one-pounders, too excited to step back to duck as the shells whistled over them. One gunner of a secondary battery under a 12-inch gun was blinded by smoke and saltpeter from the turret and his crew were driven off, but sticking a wet handkerchief over his face, with holes cut for his eyes, he stuck to his guns. Finally, as the six-pounders were so close to the eight-inch turret as to make it impossible to stay there with safety, the men were ordered away before the big gun was fired, but they refused to leave. When the eight-inch gun was fired the concussion blew two men of the smaller gun-crew ten feet from their guns and threw them to the deck as deaf as posts. Back they went again, however, and were again blown away, and finally had to be dragged away from their stations. Such bravery and such dogged determination under the heavy fire were of frequent occurrence on all the ships engaged.

WHAT IT COSTS TO MAINTAIN BATTLESHIPS ON A WAR FOOTING.

Total annual expenses	$547,000
Pay of officers, crew and marines	326,000
Rations	48,000
Equipment	12,000
Navigation charges	6,000
Ordnance	18,000
Construction and repairs	13,000
Steam engineering	32,000
General supplies	14,000
Medicine, surgery, secretary's office and incidental expenses	78,000

CHAPTER XLIV.

OUR DYNAMITE CRUISER AND THE HOLLAND BOAT.

THE VESUVIUS.

The Vesuvius is in every way unique, nothing like her in any respect existing in any other navy. She is long, narrow and sits low in the water. She is constructed of unusually light scantling and plating, has powerful engines and attains a high speed, though nothing like as high as a destroyer. She was designed especially for torpedo work, like the destroyer, but was to fire her torpedo in the air, and not, like the destroyer, under the water.

The Vesuvius was built by the Cramps, of Philadelphia, and was launched in 1888, ten years ago. Like the monitor of Ericcson, she was practically the invention and production of private individuals, though her construction was authorized by the government at a contract price of $350,000. Her principal dimensions are: Length, 246 feet; beam, 26.5 feet; depth, 14 feet; mean draft of water, 9 feet, and displacement, 805 tons.

There was much speculation as to the utility of such a craft as the Vesuvius. Many able men opposed her construction and style of battery, but quite as many took an opposite view, extolling to the utmost the ship, her speed and especially her battery of pneumatic dynamite guns. Stripped of all exaggeration, the Vesuvius represents a new and formidable element in warfare and one which can no longer be disposed of by airy critics.

It is not for a moment thought, even after the splendid recent performance of this boat, that she will create a revolution in naval tactics, as was at first contended by her projectors. Similar exaggerated offensive capabilities were for a long time ascribed to torpedo-boats, and very recently to torpedo-boat

destroyers, but the more sober-minded naval men and tacticians, it can be asserted, realize that the armored ship and the cruiser are the true types of ships for fighting battles at sea. These others are serviceable for special purposes and are necessary adjuncts of a fleet. They play an important part, but not the most important.

THE GUNS OF THE VESUVIUS.

The main armament carried by the Vesuvius consists of three pneumatic dynamite guns placed side by side, close together, in the forward part of the ship. These three parallel tubes are built into the ship, about fifteen feet of the muzzles protruding above the forecastle deck, inclined at an angle of about twenty degrees, the ends of the muzzles of the tubes rising about five feet above the deck planking. The remainder of the tubes runs down to the hold of the ship, where the compressed air machinery is and where the ammunition and the breech and loading mechanism are situated.

The tubes are made of light cast iron, are fifty-five feet in total length and have an interior diameter of fifteen inches. There are two air compressors to compress the air that is used as the propellant to discharge the aerial torpedoes from the long tubes. The subaqueous torpedo with which ordinary torpedo craft are supplied is discharged usually by a charge of gunpowder, which is quick in acting; hence the ordinary torpedo gun is short, not above eighteen or twenty feet long; but the slow, steady action of the compressed air cannot reach its maximum intensity for some time after impinging on the base of the projectile. It begins to move the torpedo gradually, and, rapidly increasing in propulsive force, drives the shot out of the long barrel at a high velocity.

The great benefit derived from the slow, steady, gradually increasing pressure of compressed air is that it allows the use of thin gun barrels or tubes and the employment of immense quantities of the highest explosives. There is an absence of all shock and a consequent avoidance of the danger ordinarily connected with the firing of dynamite or gun-cotton.

The charge of explosive at first tried in the pneumatic dynamite gun was 500 pounds of explosive gelatine. This has been changed to about 300 pounds of gun-cotton, the latter being safer to handle. This charge is held in the front end of a cigar-shaped shell seven feet long and not quite fifteen inches in diameter.

The rear end of the shell is fitted with wings or fans to insure the torpedo's preserving its horizontality during its time of flight. This torpedo is loaded to the gun at the breech, near which there is a revolving chamber holding five other torpedoes, quite after the manner in which the cartridges of a Colt's revolver are carried; hydraulic power is used to manipulate this carrier. Once in place and the breech closed, the air valve is opened, the compressed air rushes into the firing chambers and away speeds the most deadly projectile man's ingenuity has thus far devised.

The one respect in which the dynamite cruiser, speed excepted, is inferior to the torpedo-boat destroyer is in the important matter of aiming the guns. These being immovably fixed in the vessel cannot be trained and handled like other guns, they cannot be laid to hit the target by moving them to the right or left or up or down; instead, the Vesuvius herself must be manœuvred so as to get within the range. She thus becomes the gun carriage, her helm and her screws being the means employed by her for the accurate laying of her guns.

Herein lies an objection to the dynamite gun as it is emplaced on board the Vesuvius, and for a long time it was thought to be insuperable. So convinced were naval men of the impracticability of this method of pointing that the Navy Department made preparations for removing all the pneumatic fittings and dynamite guns and substituting automobile torpedo appurtenances. A lack of funds alone prevented the carrying out of this intention.

The ship being laid fair for the target, the range of the dynamite projectile is controlled by means of the amount of compressed air admitted to the gun. No torpedo of the Whitehead or Howell type can approach this, 1000 yards being an extreme

range for them, and for effective work not over 800 should be attempted.

For getting in her fine work the best distance at which the Vesuvius should operate is about a mile off, and to land her projectiles on shore or at a target at this remote distance would require an air pressure of about 800 pounds.

A gauge fixes the amount of air force necessary to throw the cartridge a certain distance, say one-quarter, one-half or a full mile. There is scarcely any sound at the discharge, and, of course, no smoke, so that shortly after the projectile leaves the muzzle it is visible to those on the ship, and the place where it strikes can plainly be seen. The firing of these air guns is done from the conning-tower by means of levers. The projectile rises swiftly to a height of nearly 300 feet, and then travels horizontally as though following a straight line marked off against the sky, and finally dips sharply and plunges into the target. There is a peculiar spiral safety arrangement on each projectile by which the fuse is rendered harmless until a flight through the air of about one-eighth of a mile is accomplished. Otherwise, the primers might explode just as the projectile left the tube, doing great harm to the vessel itself.

ATTACK AGAINST FORTS.

The tremendous efficiency of shells charged with large quantities of high explosives having been thus demonstrated, even the most bitter opponents of the Vesuvius have conceded that wherever one of her shells struck destruction would surely follow. Doubtless many Spanish soldiers within a large radius of where the projectiles struck in the Santiago batteries can attest the value of the dynamite gun as a weapon to oppose the fortifications. Herein lies both her uniqueness and usefulness and her superiority to vessels of the torpedo type.

The Vesuvius was not designed to attack fortifications, yet it would seem as though for such a role she is admirably adapted; better than for the role of ship attack, where the time needed to get herself in position for firing would expose her to a hot rapid fire that would certainly annihilate her. But give her

time and a fairly dark night and a Spanish fort for an object and no shot or other destructive missile thus far known can work such havoc.

Silently can she take her stand, and by means of range-finders accurately determine her position; then, without more noise than a big popgun would make, she can send her projectiles gracefully curving through the air into the enemy's camp. In short, the Vesuvius has a distinctive part to play in this war we are now waging against Spain. It is purely an offensive part, for she is so pitiably weak defensively, being entirely without any protection, that a well-directed rifle bullet could wreck her.

The Vesuvius could never enter a combat unsupported, but always under cover of some large vessel able to draw an enemy's fire and receive the punishment that would be otherwise directed toward her. When thus safeguarded the Vesuvius serves a most valuable purpose, and the work cut out for her will greatly conduce to shortening the bombardment of the fortifications of Cuba.

THE HOLLAND BOAT.

WHAT HOLLAND CLAIMS FOR HIS BOAT.

We want to demonstrate the power and value of a submarine boat of this size, containing the highest type of machinery and warlike implements known. As to its success, I have no doubt.

The second boat I built carried me all over New York harbor under water. I could steer it in any direction and raise or lower it at will. It was a crude affair compared with what we now have afloat. Then electric storage batteries were unknown. We seek speed and power. Our present boat will carry three Whitehead torpedoes, a dozen projectiles for the aerial torpedo thrower, each containing 100-pound charges, with a range over the water of 1800 yards.

With this boat we can bombard a fort, whose guns will be helpless to return fire, for the boat cannot be seen. With it we can enter any harbor, regardless of torpedoes or obstructions,

and blow away every impediment in its path. Havana could be reached and bombarded in spite of the Spanish fleet. Mines could be exploded ahead of us.

The first and greatest desideratum in a submarine boat is simplicity. Each man has one thing to do and nothing else. The crew will consist of one pilot, one "operator" or assistant pilot, one electrician, one engineer and two torpedo experts.

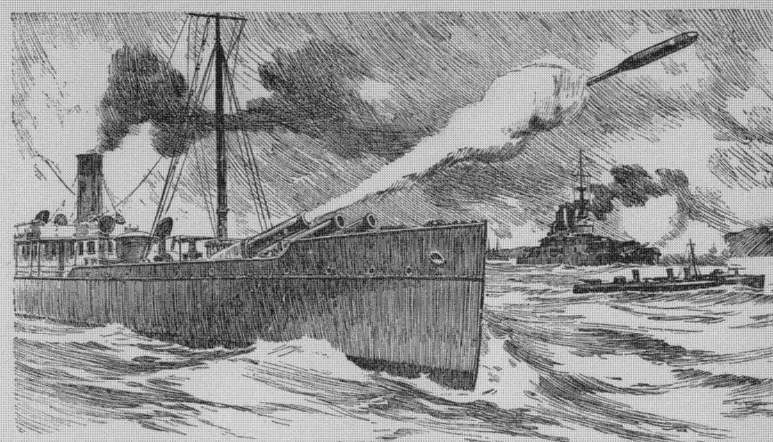
Six men can run this boat under any fleet of warships, in any harbor, attack anything on land or sea, and, at the same time, disappear after each discharge of guns and always be out of reach of the enemy's fire. There is much less danger in a submarine boat of this kind than on any surface boat.

If we make a success, and these boats become an established feature of marine and naval service, they will be used for carrying passengers through the rough sea between Dover and Calais. They are absolutely safe and free from motion. Neither fogs nor storms can have any effect on them. There will be no collisions, for they sail far below the deepest ocean liners. The passage across the English Channel can be made along the bottom of the sea in from one to two hours. With compressed air in steel tubes, such as we use in this boat, the ventilation will be perfect. These tubes stand a pressure of 3000 pounds to the square inch.

I consider that there is nothing problematic about this system of submarine warfare. Every point has been demonstrated.

In 1883, when I was sailing around on the bottom of New York harbor, I found that we could go anywhere with perfect safety. Off Castle Point, Hoboken, we were within three feet of the rocky bottom and forty-seven feet below the surface. Yet at that depth the engine worked perfectly, giving us a speed of nine miles an hour. With our present boat I expect to go sixteen knots an hour before I finish with her.

The boat is only about fifty feet long by ten feet three inches in diameter. She looks like a long locomotive boiler, either end coming to a point, afloat in the water. The only entrance into the bowels of the submarine terror is through this little steel conning-tower, not much larger than an average man.



THE VESUVIUS THROWING SHELLS.

CHAPTER XLV.

MODERN FIELD TACTICS.

ARTILLERY IN THE FIELD—CAVALRY IN MODERN WARFARE.

What astonishes all who have made a study of modern field tactics is the large number of officers among the killed and wounded at Santiago. In the first official list ten of the seventeen killed were officers and the percentage among the wounded is hardly less.

No battle in any part of the world, probably, could have furnished a better test of the new tactics, made necessary by the improvement in firearms. There were the rough ground and the long-range magazine rifles, and there also were the trained soldiers. One of the main objects of these tactics—or "drill regulations," as they are called, except when they are applied on the battlefield—is to preserve the officers uninjured as long as possible. More reliance is now placed on the intelligence of the privates, and particularly of the non-commissioned officers, than in the old days of shoulder-to-shoulder formation. Conduct that would have fastened the name of "coward" upon an officer in the Civil War is, in a sense, made compulsory today; that is, while he is still to inspire his men by example when occasion demands, he is for the most part to maintain a fixed position with relation to his subordinates, and is to keep behind shelter if he can. Thus all movements can be intelligently directed—a knowledge of which fact is more encouraging to the men than the physical presence of the officer at their elbows. The non-commissioned officers have immediate charge of the men, and opportunities are open to them such as never were dreamed of in the old days. An eminent English writer said, at the time the new regulations were adopted in his army, that in actual warfare, after the men,

the non-commissioned officers would be most exposed, the lieutenants next, the captains next, and so on; which is as it should be.

To illustrate the idea of the present battle formation, take one company alone. The principle is the same for the battalion, regiment, etc. In each company there are four "sections," each under the immediate command of a sergeant. The sections are divided into squads which are under the immediate command of corporals. At the beginning of the formation, for the offensive, one of these sections is designated as the reserve, another as the support and two as the firing line, or in any other proportion as may seem best. The first lieutenant commands the reserve, the second the firing line and the captain's post is near the support, with a bugler beside him to give signals, also the first sergeant and any who may be designated to carry messages. If he quits that post for a moment he leaves word where he can be found.

A few scouts are sent forward first. After they have gone 150 feet the firing line advances, the sections gradually separating and widening the intervals between them till they subdivide into squads and the squads in turn separate into skirmishers, who are about six feet apart when on the firing line proper. The support at the outset is about 150 yards behind the first line, ready to deploy and advance to the skirmishers, and the reserve keeps about 100 yards in the rear of the support, ready for flank attacks or to reinforce the first line. Every man is taught to take advantage of rocks, bushes and the like for cover. One object is to get as near as possible without being discovered, then to locate the enemy's fire and to deceive him as to the strength of the attacking party. The wide intervals save the men from being mowed down by the enemy.

The firing begins at an order from the captain. The skirmishers halt when they fire. Gradually now, as they advance, they close in toward the center to make room for the support on the flanks. The support meanwhile draws nearer till it joins the first line. Then there is a rush forward. The lieutenant, giving the instructions while the men are lying down or are

behind cover, commands: "Advance by rushes; third section, fire two (or three) volleys; second section, forward!" The sergeant of the third section gives the commands for the volleys. As soon as the first is fired and under partial cover of its smoke the chief of the second section orders his men forward at double time. When they have gone about fifteen yards, or to cover if there is any, he causes them to lie down and fire two or three volleys. On the first volley the third section rushes forward fifteen feet in advance of the line of the second section and fires. The second section advances as before, and so it is continued. When all the men are on the line, each lieutenant takes position behind his own platoon, and the captain is in the rear of the center. Having chosen a suitable position from which to make the assault, the captain commands: "Rapid fire!" The lieutenants thereupon order the men to fix bayonets and to lay down the sights of their pieces, after which they give the commands for the firing. To charge, the captain signals to cease firing, and commands: "To the charge, march!" The men rise and advance in double time. When they are about thirty yards from the enemy, he commands: "Charge!"

Our tactics differ from those of the English army in only one important particular. With the former, when it is necessary to advance support and reserve and prepare for the charge the first line falls back and the others deployed pass to the front through the intervals in the retiring first line. The theory there is that the first line may be too exhausted to go on to the charge. With our army the first line remains at the front, the reserve joining it in the intervals and on the flanks.

ARTILLERY IN THE FIELD.

The marvelous rapidity with which an enemy can be annihilated by modern field artillery when properly handled is being illustrated at Port Tampa every morning. The evolutions and maneuvers are most interesting, for they show how perfectly helpless a massed force would be within two or three

minutes after an artillery command caught sight of them or even suspected their whereabouts.

There are ten batteries of light artillery and a siege train of heavy guns with the army there. Their drills are held very early in the morning—too early, in fact, for the best photographic results—for the days become so terribly hot after the sun gets well up that it would be sheer cruelty to work either horses or men unless absolutely necessary.

At 7.30 the pealing notes of an artillery trumpet stirred the camp into bustling activity. Cannoneers darted out of their tents and rushed to the pieces and caissons. Horses, apparently awaiting the call, ready harnessed, trotted around toward their places as well as the trained horses of a fire department in a city could do it and a great deal better than many of them do. They were quickly hooked up, the limbers were brought to place and the trail-piece of the field rifle coupled on. Meantime the captain had mounted his horse, held by a mounted orderly, and had ridden to the front of his battery. The orderly snatched the little red flag, or guidon, from its place in front of the captain's quarters, and, affixing the lower end of its staff in a thimble on his stirrup, darted after his commander. Lieutenant Conklin looked after some of the minor details in a few seconds, and assigned me to a comfortable seat on one of the caissons. Captain Grimes raised his gauntlet, and the trumpet sounded, "Prepare to mount." The cannoneers sprang in between the wheels of the gun carriages, limbers and caissons, one on the right, one on the left and the third on the right of the rear. The two first in position grasped hands, and when the call of "mount" was sounded sprang nimbly into their seats on the broad lid of the ammunition box in front of me. In a second the entire battery, with its hundred or more horses and scores of brightly-uniformed men, who seemed as if they must get in each other's way, but never did, was on the march, taking up its way toward a broad, level plat about a mile from the camp, and just opposite the inlet that separates the camping ground from Port Tampa piers. The brake on the caisson I rode was not in order, and the commander called a halt to adjust it. While it was being

repaired the other pieces of the battery passed us. We got a quarter of a mile behind, and that wasn't where we belonged. When ready to move again I was told that I would get a little taste of high life. I got it. Sometimes I was a foot high and sometimes it seemed several yards. It might be stated that the country down here is overrun with scrub palmetto. The plant, which is a dwarfed tree, with limbs about as large as a man's arms, creeps all over the ground, and its limbs are completely hidden by its spreading, fanlike leaves. They may have been invisible to sight, but the wheels of that caisson found every-one of them. I thought of a number of bright things to tell about that ride while I was up, but when I came down they were all jolted out of my mind. It was fun for the cannoneers. They hadn't had a tenderfoot out for a ride in a long time, but they were too well disciplined to say anything about it. If I had only known that there were forty-eight loaded shrapnel shell underneath the lid I was bumping, and their non-ex-posion was due to the fact that they were well packed, I might have had a far pleasanter time while I was up, but I would have tried to alight a little easier. A caisson blew up in Chi-cago a few years ago while crossing a railroad track, and some of the fragments of the men haven't come down yet.

Amid a wild whirl of sand and dust the big horses dropped into a walk, when they reached their place, so suddenly that I almost parted company with my caisson. It was smoother riding after that, and in reply to the captain's query as to how I enjoyed the ride I said it was fun. I believe he thinks I lied.

We trotted along through the sand for half a mile, and I was really enjoying it, for I didn't know anything about those shrapnel under my lid. Suddenly the captain signalled an order to his trumpeters, and they sounded, "Right into line!"

The black-muzzled steel rifles dropped from the limbers in a second. The caissons and limbers whipped up and passed through the wheeling line of guns until their proper positions in the rear were reached.

"Load!" rang out the captain's clear voice, and the gunners swarmed about their pieces like bees. The breech-bolts were drawn, the cartridges were passed up, and in a jiffy the gunner

at each piece had his eye ranging along the sights, awaiting further orders.

"Take that most prominent ship—the one with the smoke; distance 3500 yards!" cried Captain Grimes, and before his voice had died away the guns were frowning at the peaceable transports a mile and one-quarter across the bay and fully two miles from the battery.

"Where will you strike her?" he asked of the gunner at piece No. 1.

"A little abaft 'midship, sir," replied the man.

"A very good place," said Captain Grimes. "Disable her machinery and she is helpless."

No. 2 had his eye on the quarterdeck, or where the quarter-deck would have been if the vessel had been a man-of-war. No. 3 had another vital part of the ship spotted, and so had No. 4.

I had just ranged my camera in position to catch the firing when the order rang out to fire by piece.

"No. 1, fire!"

There are other things besides buzz-saws that are not good to become too closely acquainted with, and a field rifle is one of them. I moved further away, but am glad I had the experience, for I am sure I have made a photograph of artillery firing at as close a point to the gun as any artist will care to stand for some time. In rotation, one after the other, at scarcely appreciable intervals, the big guns belched forth their great volumes of smoke with a spiteful roar. Firing by battery is noisier and more exciting, but there is such a cloud of smoke that photographing is out of the question.

After a few minutes of this hot work I witnessed some of the lightning-like maneuverings that are a part of the modern artilleryman's daily experience. A battery was seen coming through the woods, about a mile away, toward the drill ground.

"Take that battery over toward the woods; distance 2000 yards. Load—shrapnel!"

The battery had to be wheeled entirely around. Every caisson and every limber had to dash to its new position.

There was a kaleidoscopic mix-up of men, horses and cannon, until it seemed to me they would never be untangled. But every horse and every man knew just what to do and how and when to do it. I timed the maneuver, and in forty-six seconds after the new command had been given the first shower of shrapnel went hurling among that battery, over a mile away. Of course, blank ammunition was used, for if the real thing had been substituted there would be one battery less in Uncle Sam's service. Detachments of cavalry were skirmishing through the woods. Of course, the battery was an imaginary target for them, in turn, for the whole great drill ground is a chess board, upon which each troop or battery commander makes his moves. They are not made for fun, but for the education of the men, and every move has a well-defined meaning.

Every body of troops that showed up anywhere within two miles was shelled, every transport at the Port Tampa piers became a target in turn, and if anything but blank ammunition had been used there would have been a frightful slaughter.

The following morning I went into the field with Capt. S. W. Taylor and his battery of the Fourth Artillery. I lifted up the lid of the caisson to which I was assigned just to assure myself that everything was all right. I found matters entirely satisfactory, for the caisson had its full complement of shrapnel, as well as about a score of steel shells, all of which were loaded. I had company, however, and if I had realized my worst fears I would have had two companions going up. I got another taste of the palmetto-root roads, but came through is all right. The maneuvers and drills through which Captain Taylor put his battery were very similar to those described already, and were certainly very interesting. He selected first a field overgrown with tall pampas grass, which almost concealed the battery. A force of infantry half a mile away would never have seen it or known of its location until half of their force had been killed. Firing exercises were gone through with, and an hour and one-half of the liveliest kind of drill afforded ample opportunity for photographs.

To one who sees only the picturesque side of these artillery

maneuvers they savor much of a sham battle; to one who looks deeper into the subject their true significance is revealed. The gunners, although they use only blank cartridges, are trained to sight the piece as carefully as if shell were to be fired and to handle the guns with the same degree of precision and care as if in actual battle. The result of this training has been shown in field target practice at some of the Western posts within the year.

Lieut. C. G. Treat, of the Fifth Artillery, who is adjutant at the artillery sub-post at Fort Riley, devised some large targets of canvas, so mounted upon trucks or wheels that they can be moved forward or backward, or to the right or left, following the movements of a body of troops in the field. In recent target practice these canvas targets were used as support for silhouette figures representing cavalrymen, infantrymen or a portion of a battery of artillery, as might be deemed necessary. Distant 2000 to 4500 yards from the battery and out of sight in hollows between knolls, at distances unknown to the gunners, these targets were literally torn to pieces. It was shown in one test, after three shrapnel had been fired to ascertain the range, that an entire battery of artillery would have been wiped out of existence in less than four minutes had the targets been animate instead of inanimate.

In other tests silhouette targets, each representing an infantryman, were set up in fours, in echelon, representing an entire company of 106 men and officers. In less than six minutes every figure had been mortally hit, and some of them as many as seven times, shrapnel being used and the distance and exact location of the targets being unknown.

I have talked with a number of military men during the past week who are familiar with the methods of fighting that prevail in the Spanish army. They fight in solid formation, it is said, and know nothing about skirmish fighting or extended order. They have little or no field artillery in Cuba. If their army, no matter how strong it may be numerically, ever comes within range of those terrible field rifles and their death-dealing shrapnel Commander Bob Evans's prophecy will be quickly verified. As matters now stand it will not be at all

ROYAL PALMS, BOTANICAL GARDENS.

unlikely that the dons will have to take a little of this sort of gruel in the very near future, for Uncle Sam certainly isn't gathering his army here for a holiday.

CAVALRY IN MODERN WARFARE.

A good man on a good horse is the superior as an attacking force of three good men on the ground. This is a matter of common knowledge in the European capitals wherein mobs are dispersed by cavalry using the flat of the saber only more quickly than they are scattered by the bullets of militia in America. There is something in the speed, weight and size of a charging man and horse that shakes the nerve of the most stout-hearted pedestrian. The uncontrollable instinct of the footman is to get out of the way. A cavalryman learns to love his horse with a love surpassing that of woman. He learns to depend upon him. He absorbs confidence from every swell of the giant muscles between his knees. The man and the beast conjoined furnish a mutual support that is admirable, and in battle of incalculable value. Dismounted cavalry are the most difficult of troops to dislodge, for the reason that the riders, deprived of their horses, do not know when or how to run.

Military experts believe that the invasion of Cuba by the American army will furnish exceptional opportunities for the use of cavalry. It is, for the most part, a good horse country, of wide fields and level spaces. It is believed, too, that this picturesque arm of the service will demonstrate that its usefulness is not ended by modern arms and projectiles, though many theorists incline to the opinion that the days of cavalry as cavalry were ended in the times of Gravelotte and Sedan. The celebrated and fruitless charge of the French cuirassiers, where men and steeds went down in heaps and the watching William said, "It is magnificent, but it is not war," sticks in their memories. That charge was Balaklava over again. Somebody blundered. The general efficiency of cavalry under proper conditions is not discredited by it, nor is the centuries-old record of a remarkably valuable arm to be stained by an

individual failure. Men who remember what the cavalry was and what the cavalry did in the war between the States demand something more than the crumpling of one column before they surrender the beliefs of years.

The Napoleonic maxim that cavalry cannot charge unshaken infantry was due to Napoleon's experience with rundown forces. His mounted men were badly drilled and his horseflesh was poor. The great Frederick understood the high value of this branch, and his campaigns give many instances of the value of mounted troops in almost all kinds of warfare. The records of all great wars bristle with the achievements of the troopers. Even in the Franco-Prussian struggle the actual damage wrought by the Uhlans was far out of proportion with their numbers, and the value of the fear they produced was immeasurable. At Salamanca Le Marchand's British "heavies" were sent over bad ground against the steadiest of French infantry. Men and horses fell in swaths twenty yards from the line. The rear line did steeple-chase jumping over piled corpses to get to the front. Le Marchand was instantly killed and many of his officers, but the infantry was broken and the position carried. The Peninsula campaigns furnish repeated proofs of the fact that infantry will not stand against well-handled cavalry. Prince Frederick Charles, one of the greatest of modern warriors, was a steady believer in the efficacy of cavalry, and so, too, was Von Wrangel.

The opponents of the trooper arm and prophets of its utter effacement are used to instancing the failure of the brilliant Austrian cavalry at Sadowa when sent against breech-loaders. These were troopers seasoned by long service and so drilled that thirty squadrons of them were maneuvered in mass with the ease and certainty of one. They were, however, led over ground that sloped up three degrees. It was sodden with rain. The horses were so wearied that many of them fell from exhaustion when the charge began. The infantrymen who received them had been selected by five hours of savage and continous fighting. All faint hearts had gone to the rear. It is safe to say that there was not a Prussian on the west ridge of Chulum that day who did not wish to be there. Even un-

der these conditions the charge came very close to success, though all Europe was shouting that cavalry was useless against breech-loading fire.

The French got their chassepots in 1868 and 1869. No German officer believed that his troop would be of any good against them. Yet at Vionville the first line of the German cavalry halted under heavy fire on the plateau, took intervals by passaging, went off the plateau at a walk and wheeled up to the front again as steadily as if on dress parade. This, too, was magnificent, and it was war. It was done to encourage the young troops, cost only seventy men and horses, though the chassepots were barking in thousands, and it was worth what it cost. Again at Vionville Bredow's six squadrons went over two lines of "unshaken" infantry as if they were paper. In another charge the troopers went over the French cannon, losing only fifty men. They came so fast that the artillerymen found it impossible to depress their pieces with sufficient rapidity and accuracy. In this battle thirty-six squadrons of German horse proved that the French line of foot lacked the strength of cobwebs, yet this same French infantry was so good that two days later it took an entire division of the German footment three hours to go through them, at a cost of 4000 lives, or 30 per cent. of the attacking force.

There will never be any finer or steadier or more "unshaken" infantry than these French. They were privates and non-commissioned officers who, to quote Von Moltke, "sought to redeem with their life-blood the errors for which they were in nowise responsible." The Franco-Prussian war was thick with similar instances, which are carefully eschewed in the writings of anti-cavalry doctrinaires.

In the old days troops were safe when held in reserve 500 yards back of the fighting line. Now for 2500 yards behind this line the ground is torn with bullets. Consequently troops are held 3000 yards back, and even at this distance there will be occasional casualties. To take part in an engagement the reserve force must be moved entirely through this wide and dangerous zone. Infantry cannot do it in less than twenty-five minutes, and another ten minutes will be used in getting them

into line. Cavalry can cover the distance in six minutes. The rapidity with which their range alters makes them a difficult target, and the moral effect of their thundering and swift advance is great. It is estimated that the cavalry loss in a charge should not exceed one-third of the infantry loss. American military men of the more advanced kind expect service of the highest value in heavy engagements from the splendidly-composed and equipped volunteer cavalry that has gone to the front. Of their worth in scouting, reconnoissance and as media of communication there can be no question.

CHAPTER XLVI.

ELECTRICITY ON A BATTLESHIP.

THE WONDERFUL POWER DOES EVERYTHING BUT MOVE THE SHIP—IT LOADS AND FIRES THE GUNS, WORKS THE SIGNALS, LIGHTS THE SHIP AND DOES A THOUSAND OTHER TASKS.

Nowhere are the wonderful developments in electrical science and appliances in their varied phases so thoroughly yet concisely demonstrated within the same limited space as in the mechanical workings of a modern naval vessel. Within the past decade the multitude of devices pertaining to a ship's armament and equipment, which formerly derived their motive force from either steam or hand-power, have been placed so thoroughly under the control of electricity that at the present day its importance as a factor in naval maneuvering is second only to the actual propulsive power of the vessel.

It would be difficult to conceive of a situation where the installation of an electric plant involves so many intricacies in general construction and wiring, and where its various working parts are subjected to so severe a test in actual, everyday service as on board a modern warship. Whether on the wind-swept bridge or down in the sweltering furnace-room, contentions of equal gravity are constantly asserting themselves. On deck there is the changeableness and often inclemency of the weather, combined with the frequent breaking of seas over the vessel to guard against, while in the fire and engine rooms the extreme heat from furnaces and boilers, in addition to the moisture and steam from sweating pipes and escape valves, render the protection of electric wires an exceedingly difficult problem. It is, therefore, essential that the work of installation should be most thoroughly accomplished.

and only the best material employed in order to insure effectual results and reasonable durability.

Specifications covering the work in the electrical equipment of United States war vessels are exceedingly complete, embracing almost every conceivable point that could be raised. The central station and dynamo rooms are located below the water line for protection against damage from the enemy's fire.

The construction of the engines is much heavier than was formerly the case, both owing to the increased volume of power required to be generated by them, and to the former number of breakages of those in use, which indicated that strength had been unduly sacrificed in order to decrease weight.

The system of connections between the dynamos and switchboards, as employed on modern war vessels, has gradually been growing more complex from year to year, until today they retain but a slight similarity to those used in connection with ordinary electrical plants. The design of the switchboard itself is very simple. On each side of the center of the board there is a set of vertical bars, each set containing as many bars as there are dynamos with which they are connected. The electric current from the dynamos is controlled by means of switches at the bottom of the board, while horizontally across its surface are arranged the sub-switches governing the wires leading throughout the ship.

There are two divisions in the wiring of a vessel, designated, respectively, as "lighting" and "motor" circuits. The lighting circuits are again separated into six divisions, according to the service required, viz., "continual," "battle," "sea," "day" and "special" services.

While the divisions are somewhat numerous, a number of them are but sub-mains, branching from the trunk lines, which start from the switchboard in the dynamo room. Each subdivision is controlled by a double pole switch, of ample capacity, placed in a convenient location. For instance, the lights for day service are on a sub-main branching off from the mains for general service. The battle service mains have their own feeder, and start at the switchboard, carrying cur-

rents to the lamps lighting the magazines, handling rooms, ammunition hoists, central station, conning tower and battle lanterns at the guns when in action. The signal circuit leads directly from the switchboard, for the lighting of the binnacles, running lights, truck lights, Ardois signal hoist and various others for signal purposes. The searchlights have their own independent leads, and are not connected to any other circuit.

Of late years the number of circuits at the switchboard has been materially decreased by the use of "feeders." These are heavy conductors leading from the dynamo room to the general location to be lighted, where they are divided into mains connecting with the lights. The number of feeders leading from the switchboard is determined by local conditions. The circuits are divided up into decks, starboard and port or fore and aft, and sometimes it is necessary to use both combinations to keep within the limits allowed or fixed by the construction of the ship.

To keep the service intact, whenever possible the feeders are run below the protective deck, and where occasionally space does not permit this to be done, then as far inboard as practicable. The vertical risers are protected by such means as can be procured, but in no case are wires left entirely exposed, fine moldings being employed in shielding them when no other method is afforded. The wiring of a ship is an exceedingly delicate piece of workmanship, and even when the utmost care and skill has been exercised, a high insulation of the dynamo circuits becomes a necessity, for with the vast number of connections, each of which is burdened with a responsibility of greater or less moment, a cross between two wires involves many possibilities of trouble.

Having obtained an insight into the fundamental principles of electrical distributions and the conditions governing the wiring of a vessel, let us next glance at the various appliances and their usages on shipboard. The most modern war vessels are lighted throughout with arc and incandescent lights, are fitted with electric searchlights, battle lanterns and signaling apparatus, have elaborate systems of internal electrical com-

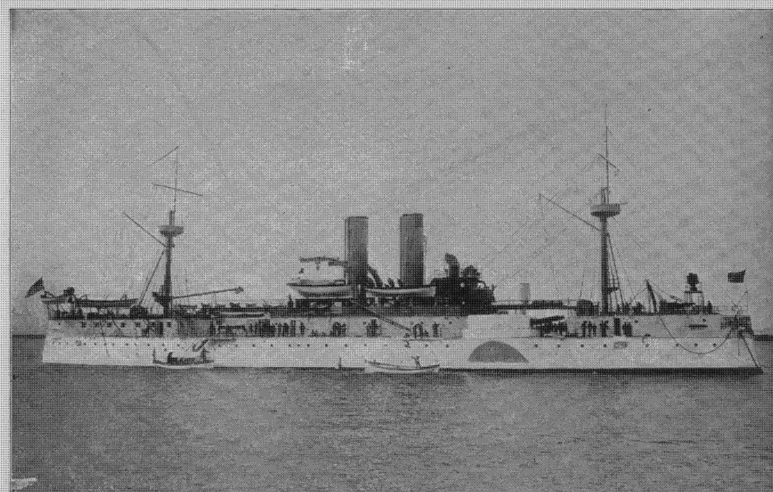
munications embracing the telegraph, telephone, various kinds of indicators and alarms, and operate all their guns, turrets, ammunition hoists, capstans, steering gear and some of their launches by electric motors.

Probably the most highly developed, and certainly the most important electrical contrivance used in naval warfare is the searchlight. Of these, several kinds are now in use in the service, the largest and most powerful being the Thomson-Houston projector. This great illuminating engine, together with its accessories, has a gross weight of 1980 pounds, is provided with a 30-inch lens, and throws a stream of light across the water in any direction desired, upon which, in clear weather, an object the size of an average torpedo-boat can be seen with the aid of glasses at a distance of ten miles.

These lights are situated on the bridges and in the fighting tops of vessels, their principal functions being to discover and light up an object whose approach has been detected, so that the gunners can accurately lay their guns. There are, however, other occasions in war time when the searchlight is of great value, such as in fleet action at night or between vessels acting singly and in attacks upon shore fortifications. The minor uses of the searchlight in the navy are too many and varied to admit of enumeration.

Of other lights used on shipboard the battle lantern is next in importance. They are generally placed in the interior of turrets and barbettes, and in the immediate vicinity of the batteries, in such positions as to throw the light only inboard, while the exterior surroundings are left in darkness. These lamps are fitted with shields which can be rotated until the rays of light are entirely cut off, thus converting them into dark lanterns. The signal lights are provided in three colors—red, white and green—and are used for various signaling purposes, especially between friendly ships at a distance from each other.

The forward decks are lighted by means of bulkhead lamps, arranged along the ships' sides and against stanchions at a height of three feet above the decks, which admits of the men's hammocks being swung from the beams overhead with-


THE BATTLESHIP "MAINE."

out interfering with such lights as are burned throughout the night. In the officers' quarters specially constructed ceiling fixtures in the form of steam-tight globes are in general use. The lights used in the engine room, bunkers and magazines are all of a distinct pattern, each being protected by extra heavy glass globes and metal guards.

The telephone is now the most popular means of communication on board ship and throughout fleets lying at anchor. Within a remarkably short space of time after anchoring the various vessels are connected by wires, which greatly facilitates the exchange of messages. Throughout each vessel the system is very complete, extending into the tops, turrets, conning towers, fire room, magazines, etc., in addition to connecting all its living compartments. The importance of such an arrangement, especially in time of war, cannot be overestimated.

Among other noteworthy features which have recently been introduced into the navy are the various kinds of electrical indicators for different uses on board its vessels. One of these is the "audible direction indicator," which is fitted to the engine room signaling apparatus. It consists of an electrical attachment to the ordinary ship's telegraph, so arranged that when an order has been signaled from the bridge to the engine room the electric bells ring in both places until the engine actually commences to work as directed. Both bells will likewise ring whenever the operation of the engine is different from that called for by the position of the pointer on the deck transmitter of the telegraph. Side by side with this instrument on the bridge is an electrical device by which the commander in an emergency can himself control the stop valve and links of the main engines of his ship, checking or increasing her speed without the possible delay involved in signaling the engine-room.

Of yet greater importance to the science of naval warfare is the electrical device known as the "range finder." Telescopes are located at any desired number of observing stations and simultaneous signals are directed to the object whose distance is desired, and beams of light showing accurately the angle of

each telescope with a meridian or base line are made on a chart at a central station. The intersection of these beams shows the position of the object and may be readily measured.

For working the guns on shipboard by electricity, two motors are used, one being placed on a bracket bolted to the rear of the left-hand frame of the carriage for training in elevation, while the other, located on the opposite side of the gun, supplies the energy for training horizontally. In both cases a clutch is interposed in such a manner that by shifting a lever the electrical connection can be thrown out and the ordinary hand gear substituted.

The mechanism employed in firing the guns is both simple and ingenious. In the base of the cartridge case is screwed an electric primer, against which an insulated steel pin, carried in the axis of the breech-block, presses. This pin is in communication with the electric wires, which carry the current to fire the primer, only when the breech-block is closed and secured by turning the lever downward against the rear of the block. The circuit is closed and the charge fired, in the case of the larger guns, by touching an electric push button or pressing a rubber bulb, and in case of the smaller by pulling the trigger of a pistol handle arranged in a convenient position close to the sights. Connected with the firing gear is a small instrument which gives forth a ringing sound whenever the circuit is complete. This notifies the gunner that everything is correct before he attempts to fire. The instrument also provides a means of warning whenever the gun is loaded, and thus is dangerous to approach within the limit of range or recoil.

The plant for operating the turrets is separate from the ordinary lighting of the ships, and consists of two units, one for each turret. Each unit consists of a horizontal engine and two direct coupled compound dynamos. In case of accident to one of the units both turrets can be worked by the other. On either side of each turret a powerful, compound wound, training motor is placed, rotating it by means of gearing and chains, combined with a number of heavy springs, which afford elasticity of movement. The motors are controlled by

a central stand in the turret, acting through a system of relays to send currents of desired strength in either direction through the armaments of the motors.

The ammunition hoist of each turret is operated by a small electric motor bolted on the outside of the turret spindle. The hoist is inside of the turret support, and consists of an endless chain leading down into the magazine and carrying shelves on which the charges rest. They are brought up to the left of the gun and deposited on a hinged platform, which, on being swung around 180 degrees, brings the charge opposite the breech of the gun, where it comes in contact with an electric rammer, which thrusts it into the chamber.

Nearly every man-of-war is now provided with one or more electric launches, operated by storage batteries capable of driving them through the water at a rate of speed ranging from twenty to thirty-five knots an hour.

CHAPTER XLVII.

SECRET SERVICE SYSTEM.

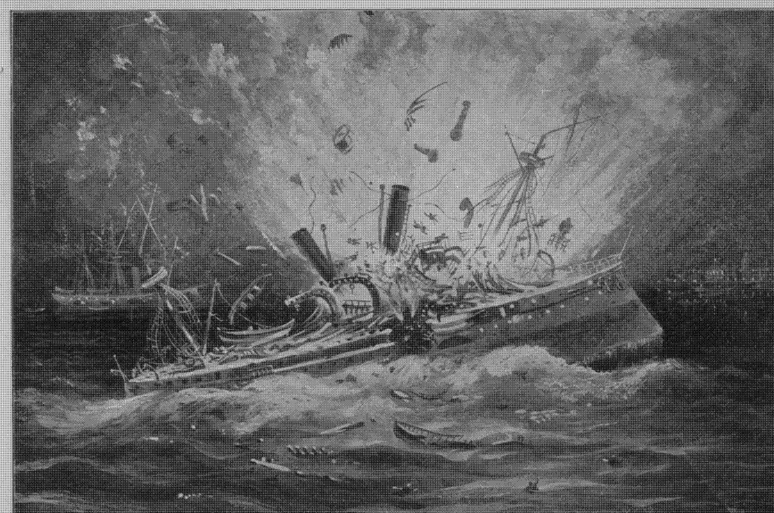
A PEEP BEHIND THE SCENES—CHIEF OF THE UNITED STATES SECRET SERVICE TELLS OF THE INSIDE WORKING OF HIS DEPARTMENT.

By John Elbert Wilkie, Chief of the United States Secret Service.

It is hardly necessary to say that such a tribute to the efficiency of the American secret service from a judge so well qualified as the former Naval Attaché of the late Spanish Legation was highly gratifying to those of us who had been lying awake nights trying to make trouble for the Spanish agents. But as our activity was simply a reflex action, due to the tireless energy of the zealous subjects of the boy King, Lieutenant Carranza will have to bear part of the responsibility for the watchfulness which he so gracefully compliments.

As the mysterious is always attractive, and as much secrecy necessarily was observed in the operations of this branch of the governmental service, curiosity concerning its work has been generally manifested. There are, however, many matters associated with its administration which cannot properly be made the subject of publication. Possibly the very thing about which one wishes most to know may not be touched upon in this paper. If so, it is doubtless because that particular thing is one about which the writer may not write.

When it became apparent that a conflict with Spain was inevitable steps were taken under the advice of Secretary Gage and Assistant Secretary Vanderlip to organize an auxiliary force of the secret service division of the Treasury Department. This was necessary, because the regular force of that branch of the government is maintained by an appropriation which



EXPLOSION OF THE "MAINE" IN HAVANA HARBOR, FEBRUARY 15, 1898.

may be drawn upon only for expenses incurred in the suppression of counterfeiting. As soon as the defense fund became available the President made a preliminary allotment of $5000 for our use, and some weeks later increased this by $50,000, which, it was estimated, would be sufficient to maintain the force for several months.

The publication of the fact that there had been a special allotment for an addition to the secret service made it wholly unnecessary to advertise for men. The applications during the first thirty days exceeded a thousand, and the pressure for appointment became embarrassing; but the peculiar nature of the work the men would have to do made it essential that they should be thoroughly familiar with Spanish. This quickly disposed of more than 90 per cent. of the applicants, and of the remainder there were few who possessed the other qualifications—detective experience, rugged health, strength, courage and enthusiasm.

THERE'S NO MONEY IN IT.

It is morally certain that when the force was completed there was not a man among them who was there for what there was "in it," the pay being $4 a day and traveling and living expenses, the latter being limited to $3 a day. With one exception they were under forty years of age. All of them fairly bubbled over with loyalty, were determined to make a record and were ready for any emergency that might arise. It may surprise a great many persons to know that the auxiliary force of the secret service during the war was smaller than the local staff of a large metropolitan newspaper; but as the men were unusually intelligent and reliable it was possible to satisfactorily cover the country with a comparatively small number of operatives.

Thanks to a patriotic public, the division was early supplied with much information relating to suspicious strangers. A realization of the danger to the country from these internal enemies placed everyone on the alert, and letters fairly poured into the office. Most of them were founded on trivial sus-

picion, but more than a thousand of the "suspects" reported by mail were investigated. The greater number of these were found to be persons who were injudicious in expressing sentiments not entirely loyal, but only when they went so far as to threaten what they would do if they had an opportunity were they warned that they were simply making trouble for themselves.

When it was possible the men were kept at headquarters in Washington for some time before being assigned to independent work outside, and as the capital was a prolific field for mysterious foreigners, there was an excellent opportunity to test the ability of the agents in various ways, especially in the important matter of "shadowing," a fine art in itself. They were also enabled to obtain a general idea of their duties, but such an arrangement was not always convenient.

However, it is pleasant to record but one failure. In that particular case I was unable to foresee the exact conditions under which the agent would have to work, and explicit advance instructions were impracticable. The man was unable to grasp the situation when he reached his station, and had to be replaced.

IN TOUCH WITH WASHINGTON.

Each operative was provided with a cipher code for telegraphic purposes, and when his territory had been assigned was expected to keep in constant touch with Washington. In my private office at headquarters I had a large map of the United States, mounted in a flat cabinet, and by means of small numbered flags attached to steel pins was able to locate every man on the force at a glance. Montreal, Toronto, New York, Philadelphia, Washington, Newport News, Savannah, Jacksonville, Tampa, Key West, Mobile, New Orleans, Galveston, San Francisco and the army camps were the principal points of activity.

Tampa was a particularly lively district, for in addition to the secret service men in the field there a branch of the Military Information Bureau, under the jurisdiction of the War

Department, was maintained, and during the latter part of the war was useful in looking after thefts of army stores, deserters and military offenders of all classes. Montreal was a good second in the matter of activity, though there were times when Washington led them all.

Occasionally, when the pressure was particularly heavy, it became necessary to detail the regular members of the division to run out certain lines of investigation, their expenses at such times being defrayed from the defense fund. Of the thousand or more "suspects" something over six hundred men and women were at one time or another under close surveillance for varying periods, among them professors, diplomats, doctors, merchants, cigarmakers, mariners, electrical experts, government employes of foreign birth and uncertain antecedents, capitalists, milliners, dressmakers, society women and servants. Every man in the service was required to make a detailed daily report covering his operations, and there were revealed a great many interesting things that had nothing whatever to do with the Spanish-American War.

SOME QUEER APPLICANTS.

Most of the applicants for appointment, which came from every State in the Union, and from England, Canada and Mexico as well, bore evidences of having been written by intelligent men, actuated by a loyal ambition to serve their country. About half of them were addressed to the War Department, but there being no secret service in that branch of the government they were referred to the Treasury Department for consideration. Many of the writers confessed to an absolute ignorance of detective work, and apparently overlooked the fact that we were dealing with a foe whose language was not our own; but among the hundreds and hundreds of letters there were many whose authors were even more at sea as to the general qualifications necessary for the work.

One man advanced the statement, among others, that he had been married four times—possibly to emphasize the fact that his courage was beyond question. Another pointed out

that, being the fortunate possessor of "Spanish whiskers," he could work among the enemy with absolute safety. As an example of the queer applications received the following is a gem well worth quoting:

"i wood be glad to render my servises to the guvernment at aney time or in aney capassity that i might be abel to do i am a man 42 years of age and traveled quiet a grate deal and at the present travel and get in with all classes of peopel my occupation is sharpening saws for butchers or aney body else that has them to do so i get amung all classes of peopel i usue 2 langwages german and the american or english spoken langwage as for writeing you can see for yureself."

The early establishment of a "crank" box was necessary, hardly a day passing without a letter or two from some irresponsible visionary or out-and-out lunatic. There were stacks of anonymous communications threatening death and destruction to everyone connected with the "unholy" war, and scores of suggestions from demented persons who had "inspired" plans for the annihilation of all Spanish emissaries. Then there was a class of cranks with hallucinations that they were being dogged by Spanish spies and in danger of assassination, while others had overheard plots to blow up the President and public buildings.

CRANKS WERE NUMEROUS.

Where such letters were signed, and it was possible to locate the writers, the matter was always investigated, but in no instance was the author found to be a responsible person. Not all the cranks stopped at writing to the department. Many of them called at the office and were led gently away, introduced to the guards at the doors of the Treasury Building, and thereafter refused admittance. One enterprising woman succeeded in getting in to see me, however, with a unique scheme to ascertain the identity of the leading Spanish agents in this country.

"This is my plan," she said enthusiastically, after introducing herself. "As soon as you engage my services I shall go

WRECK OF THE "MAINE."

to New York and look about among the theaters until I find where the most patriotic audiences gather. Then at one of the evening performances, when they are all cheering for the United States, I shall stand up in my seat and cry, 'Spain forever! Hurrah for Alfonso!' Of course, I shall be arrested, and the matter will get into the papers, and I shall be visited by the friends of Spain, who will be convinced that I am a sympathizer. So, gradually, I shall be able to worm my way into their confidence until I shall have gained all their secrets. Now, won't that be lovely?"

The chances being that if she tried it the audience might not leave enough of her to sympathize with, and as she looked as if her children might need attention, she was advised to go home. She departed reluctantly, thoroughly convinced that the government was making a fatal mistake in declining her services.

When the "emergency men," as the temporary employes of the division were termed, were instructed in the use of the cipher code they were told that in communicating with headquarters they should use, instead of my name, "John Ehlen," which I had registered with the telegraph companies. This was simply a precautionary measure, intended to protect the operatives by eliminating the chance that some one might discover the message was for the secret service, identify the sender as a member of the division, and destroy his usefulness in that particular locality, if nothing worse.

AN INTERCEPTED TELEGRAM.

Out of this arrangement grew a curious incident. In the latter part of May a young Western newspaper correspondent, stationed in Washington, sent in his card, asking to see me on important and confidential business. When admitted he explained that a telegraph operator, whom he had known for years in the West, and who had been transferred to the capital, had intercepted a cipher message from Montreal the night before, and believed it was from the Spanish headquarters to an agent here. We were particularly interested in the Spanish

messages at that time, having possession of a cipher that was being used in some of their correspondence, and the newspaper man, knowing this, had suggested to his friend the operator that the suspected communication be submitted to our office.

He had tried to translate it, but was unable to succeed, and he wondered if we would have better luck. The copy of the mysterious message, which he then produced and placed before me on the desk, was addressed to my alias, the original, from one of my men, being in a drawer at my side. Under the circumstances I felt moderately certain that we could get at its meaning, but without explaining to the correspondent I told him that if we did succeed in deciphering it, and the contents were of such a character as to permit of their publication, he should have a "scoop" on it. This satisfied him, and he went away.

A little later I called up the telegraph company and asked that the operator in question should be sent to the office for a moment. In a few minutes he was ushered in—a young, bright-faced fellow, with plenty of color in his cheeks and an air of suppressed excitement. I only guessed that he felt his discovery had been of value to the government, and he was to be rewarded in some way. In reply to my question, he detailed how he had received the message, and how, when it occurred to him that it might be from one Spanish agent to another, he had surreptitiously obtained a copy of it. The fact that it bore no local address had made it doubtly suspicious, as it indicated that it was to be called for.

AN AWKWARD INTERVIEW.

"Didn't it occur to you to see if the person to whom it was addressed was registered in the office with delivery directions?"

"No, sir."

"Well, if you had consulted your company's books you would have discovered that I am 'John Ehlen,' and that this is a government message."

The poor fellow's face was a study when he realized that he had held out an official telegram and had turned it over to a newspaper man. He appreciated the gravity of the offense in violating his oath as an operator, and felt that his position was as good as gone, under circumstances that would make it impossible for him to obtain employment with any company. He said nothing, but his eyes filled with tears.

"Have you a family?"

"No, sir, but I am supporting my old father and mother."

"Your motive was the best in the world," I said finally, "but your methods are open to criticism. Now, nothing shall be said to the company about this, but if in the future you catch any mysterious messages, just bring them straight to me without entrusting them to any outsider. If your newspaper friend had succeeded in translating this message it might have been awkward for all of us."

This was quite true, for the message in question detailed briefly, but completely, the capture of the Carranza letter. He gave me a grateful pressure of the hand, and the incident was closed.

SOME CLEVER CIPHERS.

Apropos of ciphers, there were several employed by the Spanish. There was a "figure" cipher, which we were unable to translate, and there was another whose mystery we solved. This was rather ingenious and as simple as it was clever. The day of the month on which the communication was written was the key. For instance, if the letter was dated on the 6th, the sixth letter of the alphabet, "f," was used in place of "a," "g" instead of "b," and so on. This gave a change for every day in the month.

Among the letters seized on the steamer Panama we found several in which, after completing what looked like an ordinary, commonplace letter, the author had written the secret information between the lines in sympathetic ink, which developed only on being subjected to a temperature almost high enough to scorch the paper. There were a number of

these from Mexico to suspected individuals in New Orleans, relating to the purchase of supplies to be shipped to the open ports of Cuba, and up to the time that the blockade was extended to include the whole island there was a large and constant movement of supplies from this country to Vera Cruz.

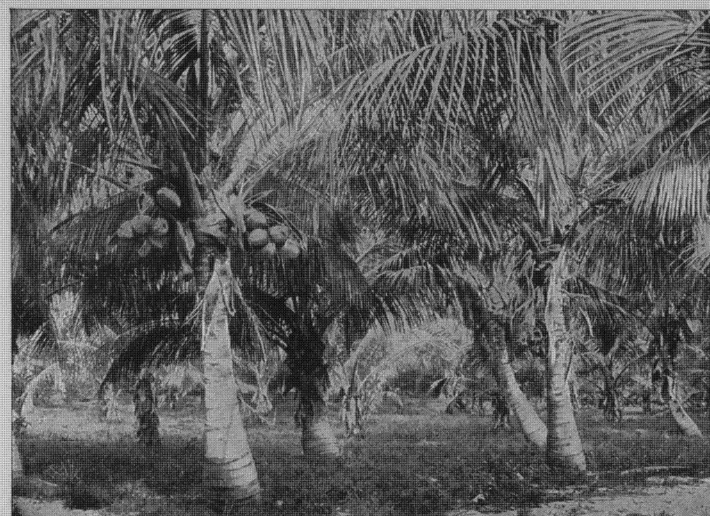
Some of the most delicate and interesting work of the department was that involving the "testing" of suspects. Given a clever operative, who could speak Spanish like a native, and the right opportunity, it was moderately certain that within a comparatively short time the subject of the investigation could be induced to declare himself. There were a few cases, however, where the conditions were peculiar and the accomplishment of the task decidedly difficult.

One of these, with a touch of comedy in it, was that of a certain German doctor in an Eastern city, whose social position was of the highest and whose reputation was the best. Several letters had been received warning us that the doctor was a most dangerous spy. He was not naturalized, and before hostilities broke out had been an avowed friend of Spain. It was stated that last year he had gone abroad, ostensibly to visit Germany, but that as a matter of fact he had gone to Austria and afterward to Spain, and now was certainly acting as an agent for the enemy.

INVESTIGATING THE DOCTOR.

After sending to several of the writers of the warning letters and establishing the fact that they were reputable and responsible persons, arrangements were made for a careful watch upon the doctor. His associations were found to include no suspicious individuals, his actions were rational, and he seemed to be behaving himself like an ordinary mortal. The facts against him were that he was an outspoken advocate of Spain, writing and speaking in her behalf, openly denouncing this country for its part in the conflict, and expressing the hope that victory might rest with the Spanish arms.

Yet this was in a sense in his favor, for it seemed more than likely a secret agent would cloak his operations under a pre-



A COCOANUT GROVE.

tended friendship for this country. But he was an influential man, with many acquaintances in governmental positions, and if the charges were well founded would be a dangerous enemy, because he was so situated as to easily obtain very important information. It was, therefore, extremely desirable to fix his exact status. The question was whether he was doing more than employing mere moral force in behalf of Spain. Any-one could obtain his friendly view of the Dons for the asking, but if he was engaged on a secret mission it would require exceedingly delicate work to ascertain the truth.

It chanced that the first week in May I had made a short trip to the West, and on the "limited" formed the acquaintance of a foreign gentleman, an Austrian, en route to Mexico. He had given me his card, a very formidable black-bordered affair, identifying him as Count L——, of Vienna, an officer of the Society of Jesus. I had kept the pasteboard, and one day, while the case of the German doctor was under consideration, a glance at it in my desk suggested a plan which was soon given a trial.

I assigned to the work an operative speaking all the Continental languages, thoroughly familiar with Austria, Germany and Spain, and otherwise especially well equipped for the task before him. He called upon the doctor, addressed him in German, begged a private interview, and then confided to him that he was anxious to do something for Spain. He alluded touchingly to the natural sympathy for his beautiful countrywoman, who was being so sorely tried. He had met Count L———, who was here on a political mission, and had spoken to him of his desire.

A BIT OF STRATEGY.

The count had told him of the great friendship of Austria for Spain, and had advised him that if he wished to serve her he could not do better than call upon the famous Doctor X, who was in a position to instruct him; because, as the count had intimated to him in the strictest confidence, the doctor was doing a little quiet secret work for Spain. The count

had written the doctor's name and address on one of his own cards. Here it was. Now, would the good doctor tell him how he could serve poor Spain? No mission would be too dangerous for him to undertake.

The doctor was much agitated during his visitor's recital, which was carried on in a cautious whisper, and when it was finished was silent for a time. Finally, he said that though he felt honored at the confidence displayed in his discretion, and would be glad to advise his friend, he himself dared do no more than write and speak for the downtrodden nation.

We were satisfied from the result of the test that the doctor was not a spy, and thereafter disregarded the warnings concerning him. A curious sequel to the agent's call was that a few days later the Austrian Minister was obliged to deny a foolish story to the effect that his government was preparing to make a friendly demonstration in behalf of Spain. I fancy the origin of the rumor might have been traced to my friend the doctor, who overestimated the Austrian count's revelation to the nervous man who was so anxious to do something for an unhappy people.

Strangely enough, the two best spies to whom Lieutenant Carranza refers in his more or less famous letter to his uncle were not Spaniards. Both were of English birth, and neither even spoke Spanish. Both are dead—one destroyed himself in prison, and the other fell a victim to deadly typhoid while incarcerated in Fort McPherson. The circumstances leading up to the arrest of these men are interesting in that they illustrate two widely different phases of the work of the agents of the emergency force of the federal secret service.

SHADOWING THE FORMER MINISTER.

One of the first men employed in the special investigation was a young New Yorker of fine family and excellent social position. A long residence abroad had given him a fluent command of modern languages. He was the possessor of much natural shrewdness, and his courage was unquestioned. He was sent to Toronto immediately after the departure of

Señor Polo y Barnabe, with instructions to keep headquarters advised of the movements of the former Minister's party, to look carefully after those who might connect with them in any way, and to do both without arousing suspicion.

He was fortunate in securing a room adjoining that occupied by Lieutenant Carranza, and as there was a connecting door, against which the head of his bed was placed, he was beautifully situated for his purpose. Early on the morning of Friday, May 6, an earnest conversation, this time in English, was being carried on in the lieutenant's room. It lasted for an hour or more. The lieutenant's visitor showed an intimate knowledge of the American navy, and referred to his own services on the Brooklyn.

Carranza first satisfied himself that the man knew what he was talking about, and then arranged for him to go to Washington, where he was to secure certain information and forward it to Montreal, for which point the former Minister was to leave that afternoon. Instructions were given in the use of the code for telegraphing, and there was much further talk in a tone too low to be understood, but the stranger was finally heard to say, "Then I am to write to this address in Montreal."

CAPTURING A SPY.

Carranza assented, and our agent, believing the visit was at an end, opened the door and stepped into the hall. He had timed his movements well, for Carranza was just bidding his visitor farewell. Together the secret service man and the stranger walked through the hall, the former asking a light for his cigarette as they passed down the stairway. At the door they separated. The suspect was shadowed to an obscure hotel, where it was ascertained that he had registered as "Alexander Cree," and that he was to leave the city that evening.

That afternoon the following telegram in cipher was delivered to me:

"Young Southerner, Alexander Cree, of Hillsboro, I think, leaves for Washington tonight. My height and build, dark,

small mustache, black soft felt hat, black sack coat, black sailor tie, somewhat shabby, evidently served on Brooklyn; has intimate knowledge of naval matters. Just had long interview with naval attaché. He is to write to Montreal."

The next morning arrangements were made to "cover" incoming trains in Washington, and by the aid of the description our man was picked out of the crowd at the Baltimore & Ohio depot with as much ease as if we had been furnished his photograph. From the moment of his arrival every movement was watched. He was evidently familiar with the city, for he asked no questions in going about. One of his trips included a call at the Navy Department, after which he returned to his boarding-house, No. 916 E street N. W., where he remained for an hour or so, going thence to the postoffice, where he mailed a letter. This was promptly secured and taken to headquarters. It bore the address, "Frederick W. Dickson, Esq., 1248 Dorchester street, Montreal," and was as follows:

"Washington, Saturday, May 7, 1898.—A cipher message has been sent off from the Navy Department to San Francisco, directing the cruiser Charleston to proceed to Manila with five hundred men and machinery for repairs for Dewey. A long cipher has been received from Dewey at Department at 3.30 P. M. They are translating it now. Cannot find it out yet. Have heard important news respecting movements of colliers and cruiser Newark at Norfolk Navy Yard, also about the new Holland boat, as to what they intend to do with her and her destination. I shall go to Norfolk soon to find important news. My address will be Norfolk House, Norfolk, Va., but shall not go until Tuesday.

"Respectfully yours,

"G. D., in haste."

This fully confirmed the suspicion that he was a hired spy and warranted immediate action. As his offense was a military one, I laid the fact before the Assistant Secretary of War and the Judge Advocate General, with the result that a military arrest was decided upon. Captain Sage, of the Eighth Artillery, with a corporal and one man, was ordered to report to me

PINEAPPLE PLANTATION.

at the Treasury Building, and at 11 o'clock that night we arrested the suspected man in his room.

We rather anticipated a lively time, but, much to my surprise, he wilted completely when I placed him under arrest, and he was led away without resistance. A search of the apartment resulted in the seizure of partly finished letters to the same address in Montreal, and documents establishing the identity of the prisoner as George Downing, naturalized citizen and formerly yeoman of the cruiser Brooklyn. In one corner of a bureau drawer, otherwise empty, I found a scrap of letter paper, upon one side of which the address in Dorchester street, and on the other these words: "Slater's Code. To send add 100; to receive subtract 100."

COLLECTING THE EVIDENCE.

This was the key to the cipher he was to employ, the system being one in which thousands of ordinary words arranged alphabetically have fixed consecutive numbers of five figures each. In preparing a telegram under the cipher indicated on the slip the desired word, having been found in the list, 100 would have been added to its corresponding number, and the word opposite the higher number thus obtained would have been used in the cipher message. In translating the cipher, after ascertaining the number associated with the word on the message, the subtraction of 100 would disclose the figures opposite which would be the real word desired.

The evidence secured in Downing's room, considered in connection with the consultation with Carranza and the letter mailed to Montreal, would have been sufficient to insure conviction, and the prisoner evidently appreciated the fact, for two days later he hanged himself in his cell at the barracks. It may be added that the Dorchester street house had been rented furnished by a Spanish agent the day before Señor Polo left Toronto, but it was soon after given up.

The operations of the Spanish agents in Canada were materially aided by a private detective agency of the Dominion, through which an attempt was made to carry out an extensive

and rather ingenious scheme for the collection of information about our forces. Young men who had had experience in the Canadian or English military organizations were to proceed to various points and there enlist in the American army, San Franciso and Tampa being selected as the most advantageous points from which to operate. The spies were to quietly collect all the facts as to troops, guns and so on, to proceed with the army of invasion to Manila or Cuba, as the case might be, and upon reaching the foreign port were to escape at the first opportunity and deliver themselves into the hands of the Spaniards.

Each was to be provided with a plain ring, of gold or silver, upon the inner circumference of which were engraved the words, "Confienza Augustina," and this token was to be sent by a messenger to the commanding officer as soon as possible after reaching the Spanish lines. The general, or whoever received the ring, having been instructed that these would be sent by spies in their service, would summon him and hear his report. He would then be permitted to make his way back to the American lines to establish such other means of communication as might suggest themselves.

EXPERIENCE OF TWO ENGLISHMEN.

The first of these agents to be secured was a young Englishman in Montreal, whose name might have been Atkins. He was down on his luck, out of work and desperate. He was treated liberally with liquor, and the scheme was unfolded to him at the office of the detective agency when he was in a properly receptive mood, and where he was accompanied by another young Englishman, Frederick Elmhurst, who had just served his time in one of the Canadian batteries, and who was also willing to go into the plot.

The following day they were taken to the London House, in Montreal, and there met Lieutenant Carranza, who, after looking them over, asked if they understood what they were to do and were willing to undertake the mission. Both agreed to the proposition. They then separated, and Atkins, who

was to go to San Francisco, was given $100 with which to pay his transportation, provide himself with the ring and have something left over for emergencies. He bought his ticket, but fortunately waited until he was sober before packing up. When his brain had sufficiently cleared to enable him to realize what he was doing he decided to wait awhile.

In the course of a few days he hunted up his old colonel, made a clean breast of the whole matter, and was advised to have nothing to do with it. Then he called on a former employer in Montreal and told him of the proposition and of his determination to fight shy of it, adding that he was "an Englishman and he'd be blowed if he'd fight against white men for any —— foreigner."

One of the Spanish-Canadian private detectives, meeting Atkins some time later, decoyed him to a cheap hotel, where he beat and threatened to kill him, and the victim, fearing further violence, left the country in a cattle steamer bound for Liverpool. His Montreal friend, who was an American, having redeemed the unused railroad ticket and taken possession of the ring, reported the matter to one of the United States consuls, who forwarded the information to Washington.

ANOTHER SPANISH SPY.

Just before this information reached us one of our men at Tampa found that a man known as Miller had attempted to enlist there, but had been refused, as no more men were being taken at that time. Miller was stopping at the Almeria Hotel, and it was soon learned was in telegraphic communication with Montreal. Tuesday, May 24, the following message was intercepted by the military censor:

"Cannot telegraph money today. Move from where you are and telegraph from some other town. Write fully re stocks at once. Will wire money and instructions on receipt.
"SIDDALL."

This being considered sufficiently suggestive to warrant his detention, he was taken in by our agents. Papers in his possession included a declaration of intention, from which it ap-

peared that his correct name was Frank Arthur Mellor, and that he came from Kingston, Ontario. Other messages on his person were not satisfactorily explained, and he could not tell what was meant by the order to move to another town and "write fully re stocks."

Suspicion became a certainty on the Sunday following his arrest, when I received the Carranza letter, captured in Montreal, and found the reference to the second of the best spies who had been arrested "day before yesterday in Tampa." The Carranza letter was written Thursday, May 26, and the date referred to would therefore have been Tuesday, when Mellor was taken into custody. However, as it would have been hardly fair to prosecute Mellor on the Lieutenant's unsupported statement, copies of telegrams, with other information obtained from Tampa, were forwarded, and the agents at Montreal were set at work confirming the Canadian end of the conspiracy.

It was soon established that Mellor had been intimately associated with the Spanish-Canadian detective agency, and was the man who approached Atkins on behalf of the firm to go into the scheme of enlisting and carrying information to the enemy. Siddall, whose name was signed to the message, was found to be a barkeeper in a Montreal dive, and, through a woman, had been induced to loan his name to the detectives. Atkins was brought back to this country, and in a sworn statement fully corroborated the mass of evidence already in our hands.

THE DEATH OF MELLOR.

In the meantime Mellor, who had been sent to Fort McPherson, had been visited by a Montreal attorney, who had been seen in close consultation with the private detectives, and Siddall acknowledged that he had given this attorney an order on the telegraph company for copies of the original messages sent from Canada. In various other ways the connection between the Spanish headquarters in Montreal and Mellor had been established, and the evidence was in the possession of

the Judge Advocate General, who had the charges prepared when the protocol was signed.

Had Mellor lived it is quite likely that peace would have given him his liberty, but typhoid claimed him about ten days after the cessation of hostilities. Frederick Elmhurst, the Canadian who had succeeded in enlisting at Tampa, was arrested and held at Fort McPherson until recently, when he was sent North and released.

It was generally believed that when Señor Polo's party lingered in Canada it was the intention to establish an information bureau, and one of the principal tasks of the division was the breaking up of that institution. While many facts ascertained by the agents of the American secret service made it certain beyond question that a regular system of espionage was being conducted on neutral territory, there was not enough on which to approach Great Britain with a request for the expulsion of the offenders, and we were anxious to obtain something conclusive upon which action could be based. The men in Montreal were particularly alert for the right sort of evidence, and never left the Spanish combination alone for a moment.

When the former Minister returned to Spain Lieutenant Carranza and Señor du Bosc rented a furnished house at No. 42 Tupper street. They took it for two months only, and having ascertained this fact, one of our men secured a card from the real estate agent, requesting that the tenant kindly permit the bearer to see the house. A party of three was then made up, including a lady, and about 11 o'clock in the forenoon of Saturday, May 28, they called, were admitted by the maid, and shown slowly through the various apartments.

Carranza and Du Bosc were at breakfast in the lower part of the house, and as the visitors passed through the sleeping-room of the former one of the men saw an official-looking letter, stamped and ready for the mail, lying upon a dresser. The lady and one of her companions moved out toward the hall with the servant, while the third member of the party slipped the letter into his pocket. In the lower hall, just before they left, the postman passed in three large letters, and these would

also have been in our possession in a moment but for the sudden appearance of the maid, who took charge of them.

As quickly as possible after leaving the house the letter was enclosed in another envelope, bearing both American and Canadian stamps, and was entrusted to an American locomotive engineer about to start upon his run, and who was instructed to take it as far as Burlington, Vt., and then mail it. He carried out his share of the work perfectly, the letter coming through all right and being delivered to me late Sunday night.

Immediately after leaving the Tupper street place one man and the woman left for Toronto and the other operative went out into the suburbs to look after another suspect. The excitement in the vicinity of the Spanish headquarters when the loss was discovered may well be imagined. Carranza knew what damaging admissions he had made, and if, as he feared, the American government had his letter, his usefulness to his own was practically ended. He first denied that the letter was of any special value, and when a translation was printed claimed that certain of the published statements were not in his letter, asserting that interpolations had been made and whole sentences wrongly translated.

He secured the arrest of a Montreal private detective, whom he charged with the abstraction of the letter, but as the prisoner looked about as much like the man who really got it as young Sothern does like Buffalo Bill the case fell through. The public is familiar with the legal proceedings that followed when the detective tried to recover damages for false arrest, and the subsequent action of the British and Dominion governments is too recent to require repetition. It is only necessary to say that the letter gave the finishing stroke to the Spanish-spy service in America.

By courtesy of the editors of the New York Herald, we have the privilege of giving the above article.

CHAPTER XLVIII.

WOMEN WHO MAKE FLAGS.

IN THE BROOKLYN NAVY-YARD THEY WORKED NIGHTS, SUNDAYS AND HOLIDAYS DURING THE WAR.

Preparing the colors for which gallant warriors are to fight seems to have been essentially feminine duty which has obtained from very early days. Fair ladies in the Middle Ages embroidered the banners under which their knights fought, and, although flagmaking now is put upon a business basis, it has been the work of women in the United States since the first flag of the country was made down to the present day.

During the past war, for three months a large number of women worked literally nights, days and Sundays to get ready the emblems for which Uncle Sam's men were to fight. The Brooklyn Navy-Yard has a big flag manufactory where most of the flags for the navy are made, and that means that a great many flags are turned out there annually in days of peace, to say nothing of in war times.

A large vessel carries—many people will be surprised to know it—forty American flags. The Oregon, the Chicago and the Iowa all carry that number of American flags, and naval vessels generally carry from thirty to forty—that is, counting the four jacks and pennants, but not including the international signal flags and the flags of the countries at which a vessel is to be stationed, though all of them are made in the big equipment building in the Navy-Yard.

Flagmaking would not be so much of a business if there were no foreign flags. The Stars and Stripes are comparatively simple to put together, but when it comes to sewing a whole landscape and water scene on a flag, to say nothing of any number of symbolical devices in more brilliant colors

than the rainbow ever dreamed of having, and putting the land or seascape, or whatever it may be, on two sides of the flag without so much as a stitch showing through, all in exact proportions, then there is something to do in making a flag.

There are three rooms in the equipment building which are given up to flagmaking. One of these is very large, and the two others, at either end, comparatively small. There are machine sewers and hand sewers, and, with scissors, pincushions and flatirons for pressing scattered around, the place does not look unlike a dressmaker's establishment, though the colors of the materials used are more brilliant than any that would be found at any dressmaker's this season.

Allowing from thirty to forty flags to a ship, and the united efforts of wind and weather to destroy them as soon as possible, it will be seen readily that fourteen women—the regular number employed—could be kept busy at all times making flags; and with a war that necessitated a large number of new vessels, many of them without flags to their names, the number of workers was quickly brought up to seventy and the working hours were extended five hours—from 8 to 10 instead of from 8 to 5. When the rush of work was about over they sent out from the flag department 1800 flags in one week. What they sent out in the big rush days they could not tell; there was not time then to stop and count.

The greater number of the regular flag workers have been at work there for a number of years. Miss Mary Woods, who is at present in charge of the department, has been making flags for sixteen years. For those who know how, the flagmaking is not difficult, but to be obliged to instruct a number of women when there was a great rush was difficult, and some of the women who were tried could not be taught. When they did get the requisite number an entire loft in another building was taken in addition to the rooms always in use. There were extra men for the finishing—work which men always do—and everyone was obliged to work long hours, Sundays and holidays. They did, however, have Fourth of July, for it would hardly have seemed right for flag workers to disregard that important day; but they had worked through

Decoration Day. There was extra pay for all extra time and double pay for holidays and Sundays, to say nothing of the patriotic satisfaction to be taken in the work, and no one complained. There was still a rush of work after the extra ships had been equipped, for the regular work had been neglected, and there was much of that to be done.

The men employed in the flag department cut the stars and bias pennants and put on the finishing touches and the heading through which the rope is run. They also put in the ropes and mark the heading in stencil with the nationality of the flag and the number which indicates the size. When this is done the flag is rolled, with the heading and stencil marks out, and sent to the storehouse ready for use.

The women cut all the square flags and the devices for them. There is a pattern for every flag, and what may be called a flag fashion book. This is a square book containing colored illustrations of the flags of the world. Most of the flags are bound into the book, but when a country has changed its flag within a few years an original design is made and fastened in. All the patterns are put away when not in use, in paper bags, each marked plainly on one end with the name and number, which can be plainly seen when the bag is opened. There are no specialists among the flagmakers, and each woman makes whatever flag may happen to be given to her, cutting it and finishing it entirely.

There is no monotony about the work, for the flags vary in size and design. It is pleasant work; anyway, the flagmakers say so. Of the American flags, of which the greatest number is made, there are forty-four flags in a set of general signals used in the navy, and these are in three sizes, with the regular flag in nine sizes, ranging in number from 1 to 10. The first flag, No. 1, is the largest, and measures thirty-six feet, while the smallest, No. 10, measures only thirty inches. There were only eight flags at one time, ranging regularly from the large No. 1 to the No. 8. Then a very small flag was needed for the small boats, and one two sizes smaller than any then in use, the No. 10, was made, and now forms one of the regular flags. There are also the long, narrow

pennants raised above the flag on the homeward-bound ships, and these range in size from No. 1 to No. 6, the former being seventy feet long and the latter six feet. A 70-foot pennant, which is nothing but ribbon in width, is very long, and the 40-foot pennant is more often used.

There are nineteen international signal flags and forty-three foreign flags that are made. All of these used in the navy are made in the Navy-Yard, and most of the American flags, though a few of these are made at Mare Island. There is no guesswork about the making of a flag. Everything must be done by exact measurement, and a flag having two sides, which must be exactly alike, makes the work difficult, particularly with the foreign flags, where the devices have much detail.

Since the rush of work began in the Navy-Yard, about April or May, the stars have been put on the American flag in a new way which is at once better and quicker. The stars are of ordinary white cotton cloth, and up to that time they had been put on by hand, with the edges neatly turned in, sewed first on one side of the blue field and then on the other. But that was too slow work when flags were being turned out by the wholesale, and what is called a zigzag machine was purchased. This machine makes a sort of cross stitch, and with it the stars can be sewed on both sides of the flag at once. The stars are basted on, raw edge, and on the other side of the bunting, under each star, is placed a square piece of white cotton. The cut star is then sewed on with the machine, which, crossing from one side to the other of the edge, holds it in place neatly, and as it does this it also stitches, of course, the shape of a star on the square piece of cloth which is on the other side of the bunting. The cloth is cut away close to the stitching and the star remains. Thus two stars have been sewed on instead of one, and it is all done in a quarter of the time it would take to do the work by hand.

The devices on ordinary foreign flags would make the ordinary seamstress despair. It is fancy work on a large scale. There are the wonderful landscapes, with round-faced suns with halos coming up from behind gay-colored mountains,

over which rainbows worked in four or five lines of outline or chain-stitch in as many different colors make a scene which would surprise an artist. Then there is also water, which is also worked in with some kind of embroidery stitch; red liberty caps, whole menageries of animals on different flags, and any number of other things, all in brilliant colors of bunting. Many of the devices, circles and scalloped circles, being on the bias, require careful manipulation to prevent stretching, and when there were new hands at work they were given the straight seams as far as possible. All the devices are run around the edge, not hemmed, as this makes them lie more smoothly. The work on the flags must not only be neatly done, but it must be strong, for the wind is no respecter of careless needlework.

The flags of Costa Rica and San Salvador are considered the most difficult to make, from the elaborateness of their devices, and the German flag is somewhat difficult, though the workers say they are all easy when once you know how. The largest foreign flag is only twenty-five feet. None is made as large as the American flag No. 1. The largest-sized flags are made of 19-inch bunting, and the narrow pennants of a narrow 4½-inch bunting, which comes on purpose for them.

Every flag that is made is measured on the floor after the seams are sewed to insure the exact measurement. There are metal pieces set into the floor, and each one is marked for the different flags. For the 36-foot flag, however, there is no measure, and when it is spread out it covers nearly the whole floor of the large room. The United States is not hiding her light under a bushel when one of her warships is flying these big flags which the women of Brooklyn make.

CHAPTER XLIX.

UNIFORMS WORN BY UNCLE SAM'S AND SPAIN'S SOLDIERS.

The regular army of the United States has but 2179 officers and 25,353 privates on its roll. By the Hull Reorganization bill its strength is increased to 61,000. In addition the President issued a call for 125,000 volunteers. The organized militia force, according to the report of the Adjutant-General, was 114,362, so the volunteer army was made up almost altogether of the trained citizen soldiery.

The uniforms of the army are very similar, being distinguished only by the insignia of rank and the different divisions.

On parade all officers wear plain, double-breasted dark blue coats, the generals alone having black velvet collars and cuffs, with three buttons on them. Officers of the line (captains and lieutenants) have two rows of buttons down the front of the coat. Staff officers have nine buttons in each row. The rank of the generals is indicated by the number and arrangement of the buttons. A general has two rows, of twelve buttons, in four groups of three each. A lieutenant-general has two rows of ten buttons, three buttons grouped above and below and four between. A major-general has two rows of nine buttons, in three groups of three. A brigadier-general has two rows of eight buttons, arranged in pairs. The fatigue coat of officers is a short jacket, dark blue, with lie-down collar, encircled by five buttons, with three small buttons on the sleeves. Chaplains wear black coats, with standing collars, and one row of nine black buttons. The trousers of generals, officers of the general's staff and staff corps are dark blue, without stripes; for officers of the infantry, cavalry and artillery, light blue, with stripes one and one-half inches wide of the color of the

corps, white for the infantry, yellow for the cavalry, red for the artillery.

On parade generals and officers of the general staff and staff corps wear chapeaus of black silk plush, with two (generals three) black ostrich plumes, gold clasps and a gold eagle with two gold tassels. This hat is worn toward the left, so that the end is directly over the left eye. All mounted officers of the infantry, cavalry and artillery wear cork helmets, covered with black cloth and a gilded metal eagle, with the number of the regiment in white metal on the shields, chains under the chin of yellow metal, cockades, according to the corps, yellow, red or white. Unmounted officers wear similar helmets without cockades. In summer helmets covered with white cloth are worn. The caps of the generals are of dark blue cloth, with stripes of belt velvet and gold embroidery in front. The caps of all other officers are the same, without the stripes of velvet, and the mark of the corps on the front. On the generals' caps is a gold-embroidered wreath, surrounded by the letters U. S. in silver embroidery. The adjutant-general has a gold-embroidered wreath around a silver shield, with thirteen stars about it. The engineering corps has a gold-embroidered laurel wreath around a silver shield, representing three towers. The ordnance corps has a gold-embroidered bursting grenade. The signal corps has a gold-embroidered wreath of oak leaves around a silver-embroidered emblem, representing two banners and a torch. All of the staff corps have their caps decorated like the generals'. Cavalry officers have on their caps two gold-embroidered crossed swords, with the number of the regiment embroidered in silver. Those of the artillery have two crossed cannon, embroidered in gold, with the number of the regiment embroidered in silver in a circle between them. Those of the infantry have two rifles crossed, worked in gold and the number of the regiment worked in silver above. Epaulets are worn on parade only. Generals have large epaulets, with heavy fringes, metal crescents on a gold field. All the other officers have epaulets with twisted gold cord and cloth fields of the corps color.

The marks of the various corps are: Adjutant-general's de-

partment, a silver shield, with thirteen stars between the twisted cord knot in the field, which is dark blue. The inspector-general's department has an emblem consisting of a sword and a Roman bill in silver on a dark blue field. The judiciary corps has a cannon and pen crossed in silver on a dark blue field. Quartermaster's department has the letters Q. D. worked in silver on a blue field. Commissary department, S. D. worked in silver on blue. Medicinal department, M. D. in the same way. Paymaster's department, P. D. in the same way. Engineer's corps, a shield of three towers, worked in silver on blue. The ordnance, a bursting grenade in silver on blue. Signal corps, two crossed banners and a torch in silver on blue. Cavalry, artillery and infantry, the number of the regiment worked in silver on fields of yellow, red or white, respectively. The shoulder-straps for all officers have cloth fields one-quarter inch broad and embroidered edges. On these shoulder-straps are the marks of rank. The general has two silver stars and an eagle embroidered in gold. The lieutenant-general has three stars embroidered in silver, the middle one being slightly larger than the others. The major-general has two stars embroidered in silver; the brigadier-general a single silver star in the middle of the field. The captain has four lines in silver, two at each end of the shoulder-strap; the first lieutenant has one line on each end; the second lieutenant has a plain shoulder-strap.

Generals alone wear scarfs, and these are of light yellow silk, the brigadier-general wearing his around the waist, while the generals of higher rank have them over the right shoulder. The sword-belts are buckled over the coat. Those of the generals are of red leather, with three rows of gold embroidery; those of the staff officers are of black lacquered leather, with a single broad stripe of gold; those of officers of infantry, artillery and cavalry are of black leather, with four rows of gold and three rows of silk the color of the corps.

The uniforms of the privates are all of the same pattern. The coat of the infantry for dress parade is dark blue, with a row of buttons, standing collars of white cloth, six buttons on the breast, shoulder-straps of white cloth,

with a small button on each; white cloth cuffs, with three buttons. The fatigue coat is a dark blue blouse, with lie-down collar, having a row of five buttons and three small buttons on the sleeves. This serves for all the various corps.

The foot and unmounted artillery have the same dress coat as the infantry, but scarlet cloth collar, shoulder-straps and cuffs.

The engineer corps is the same as the artillery, but the shoulder-straps and cuffs have white facings. The ordnance corps, same as engineers, but dark red collars, cuffs and shoulder-straps.

The cavalry coat is the same as that of the infantry, but shorter; it has only four buttons on the breast; collar, shoulder-straps and cuffs are yellow. Light and mounted artillery, like the cavalry, with red collar, cuffs, etc. The trumpeters the same as the corps to which they belong.

The privates of all the corps wear light blue trousers and stripes the color of their shoulder-straps, and dark blue caps, with the marks of their corps and letter of the company in brass.

UNIFORMS WORN BY OFFICERS AND MEN WHO MAKE UP SPAIN'S ARMY.

The total war strength of the Spanish army is estimated to be 1,500,000. The regular army counts but 83,000 men, the first reserve 160,000 and the second reserve, called out only in the last extremity, 1,000,000. Over 200,000 soldiers have been sent to Cuba, but of these hardly more than half are ready for service. Of the regular army, 64,000 form the infantry, 14,000 the cavalry, 11,000 the artillery and 5000 the engineering corps. The infantry is armed with the Mauser .276-caliber magazine rifle, holding five cartridges. The cavalry carries swords and Mauser rifles, the Uhlans (lanceros) having lances six feet long and revolvers. The artillery has Krupp rifled breechloading rifles of different sizes.

The officers on the general's staff wear dark blue military coats, with lapels and collars of the same, the latter embroid-

ered in gold, dark blue trousers, with light blue stripes and scarfs of light blue silk. The "ros" white, with a light blue plume on gala occasions.

The infantry has a dark blue military coat, with a red collar and lapels and yellow buttons. The trousers are red, with dark blue double stripes. The "ros" is gray, with a red cockade, and the cloak blue, with red seams and cuffs. Instead of high boots, black gaiters are worn. The infantry officers wear pelisse-shaped coats with seven rows of black cord on the front. The foot chasseurs also wear dark blue coats, but have green lapels, collars and cuffs and yellow buttons. Their trousers are red, with dark blue double stripes. The cloak has green cuffs and their "ros" green cockades. The Spanish cavalry have various divisions, each with a distinctive uniform. The Uhlans (lanceros) wear light blue coats, with two rows of six white buttons down the front. Their collars, cuffs and shoulder flaps are of the same material, with white trimming. The trousers are light blue, with white stripes, and they have steel helmets, with white buckles. On their lances they carry streamers of red and yellow. The dragoons have light blue coats, with five rows of black cord across the breast and black edging. Their collars and cuffs are red and buttons white metal. The trousers red, with light blue stripes, and the steel helmets have yellow buckles. The mounted chasseurs have light blue pelisse-shaped coats, with black trimmings like the dragoons, red collars and cuffs and red trousers with light blue stripes, also like them. But in place of the steel helmets they wear light blue shakos, with a white tuft on gala days. There are two divisions of hussars, those of "the Princess" and of Pavia. The former wear light blue cloaks, with numerous strips of lace across the breast and similar Hungarian lacings on the sleeves. Tight light blue trousers with yellow stripes and a pelisse of white cloth, trimmed with black fur, white shakos, with yellow buckles. The hussars of Pavia have red cloaks with light blue pointed cuffs. The lace used is yellow, and the tight trousers are light blue, with yellow stripes. The pelisse is of light blue cloth,

with yellow lace and black fur trimming, red shakos and yellow buckles.

The royal escort which accompanies the Queen Regent and the King in their rowal progresses have dark blue military coats, with red lapels and white buttons, silver epaulets and silver lace trimmings, steel helmets, with yellow buckles and white horsehair tufts for gala days and white leather belts. On parade they also wear cuirasses and dark blue dress coats, with red lapels, and red vests buttoned in the front, white trousers and high boots. The artillery have dark blue military coats, with lapels and collars of the same color, yellow buttons, dark blue trousers, with red stripes, and white "ros," or cap, together with white leather belts.

The engineering corps have dark blue coats, collars and lapels, white buttons, dark blue trousers, with red double stripes, white caps and belts.

The administration corps have dark blue coats, with blue cuffs and red collars, blue trousers, with red stripes, white caps and black leather belts.

The carabineers have dark blue coats, with red collars, and yellow buttons, and dark blue trousers, with red stripes. The coats worn by their officers have black cord across the breasts, white caps and black leather belts.

The gendarmes (guardia civil) have dark blue coats, with red collars and cuffs, and two rows of white buttons, dark blue trousers, three-cornered hats and leather belts of the natural color. The mounted gendarmes wear on parade blue dress coats, with red cuffs and lapels, and red vests buttoned on, white riding trousers and high boots.

The halberdiers (palace guards) wear frock coats of dark blue cloth, with white collars and red lapels, dark blue trousers, with red stripes, and three-cornered hats. On parade the coat has strips of red cloth buttoned across the front, red vest, white trousers and high boots.

The sanitary corps have dark blue coats, with lapels and cuffs of the same, yellow buttons, dark blue trousers, with double red stripes, and white caps.

The detailed division of the troops of the Spanish army is as follows:

INFANTRY.

Two companies of Royal Palace Guards (halberdiers), 56 regiments of the line, 2 battalions, 4 companies in each; 20 battalions of chasseurs, 4 companies in each; 4 district regiments in Ceuta and Mellila, 1 disciplinary battalion in Mellila, 2 district regiments in the Canary Islands, 58 reserve infantry regiments, 6 reserve infantry regiments in the Canary Islands. Strength of the infantry in peace, 64,000; strength of the infantry in war, 240,000.

CAVALRY.

One squadron Royal Escort, 8 regiments of Uhlans (lanceros), numbered 1-8; 4 regiments of dragoons, numbered 9-12; 14 regiments of chasseurs, numbered 13-18 and 21-28; 2 regiments of hussars, numbered 19, 20; 1 squadron of chasseurs in Mallorca (Balearic Islands); 1 squadron of chasseurs in Ceuta; 14 cavalry regiments in reserve. Calvary strength in peace, 14,000 (1000 horses); cavalry strength in war, 27,000 (22,000 horses).

ARTILLERY.

Five regiments of field artillery (4 batteries each, 9-cm. guns; 2 mounted batteries accompany two of the field artillery regiments; 9 regiments of field artillery (4 batteries each), 8-cm. guns; 2 regiments of artillery (for mountain warfare, 4 batteries each), 8-cm. guns; 9 regiments of fortification artillery, 3 in 6 companies, 6 in 4 companies; 7 companies of mechanics, 7 reserve stations. Artillery strength in peace, 11,000 (3800 horses); in war, 60 companies of garrison artillery, 49,000.

ENGINEERING CORPS.

Four regiments of sappers and miners, 2 battalions in 2 companies for each; 1 district company of miners in Balearic Islands, 1 pontoon regiment, in 4 companies; 1 railway battalion, in 4 companies; 1 telegraph battalion, in 4 companies; 1 topographical brigade, 1 section mechanics. Strength of engineer corps in peace, 5000; strength of engineer corps in war, 12,000.

The gendarmes have 130 companies on foot and 15 companies mounted—1400 in all. The carabineers have 30 regiments on foot and 7 regiments mounted—14,000 in all. The sanitary corps counts 750 in peace, 4830 in war.

CHAPTER L.

MUSTERING OUT THE ARMY.

HOW THE GREAT ORGANIZATION OF VOLUNTEERS WILL BE DISBANDED—A STUPENDOUS TASK, WHICH WILL TAKE SEVERAL MONTHS TO COMPLETE.

Immediately after the surrender of Lee to Grant the United States Government began to return to the peace establishment. The work of the vast army of men from the North was about over and their mustering out was soon to take place. Four days after this surrender Secretary of War Stanton issued orders stopping all drafting and recruiting, curtailing the purchase of arms and supplies and reducing the number of general and staff officers.

Before the close of April, 1865, preparations were made for mustering out the volunteers. Because of the great number of men in the service this took considerable time. Up to August 7 of that year 640,806 men had been mustered out; on the 14th of September that number had been increased to 741,107, and by November 15 900,000 were returned to private life.

Before these men could be stripped of their martial connections it was necessary to balance the account of each with the government, pay him what was due him and then present him with an honorable discharge.

Now that the war with Spain is ended a majority of the volunteers are ready to leave the service that presents in the future nothing more exciting for them than garrison duty, and return to civil life. They are as anxious to be mustered out as they were to enlist, now that their duty has been performed.

With the signing of the protocol came thoughts of home to the absent volunteer, and those at home began to look anxiously to the time when he should be able to return. This

time will not be long, for orders have already been issued to muster out of the service such volunteer organizations as are not needed for garrison duty in Cuba, Porto Rico or the Philippines.

Under the present regulations the work of making private citizens out of soldiers will take considerably more time than it did after the close of the Civil War. Since then the methods of the War Department have been changed considerably, and there is an increased amount of what is called "red tape." While the necessity of this may not appear to the average civilian its value is appreciated by the army officers, who are in charge of the records of the War Department. One departure that seems strange to the veteran of the 60s is the order that each volunteer shall have to stand another physical examination, such as he went through at the time of his enlistment. Of this more will be said later.

Previous to the muster out officers and men who have served outside the United States will be granted leaves of absence and furloughs for sixty days, while those who have not served beyond the confines of this country will be granted leaves of absence and furloughs limited to thirty days. This is the sense of a general order issued by the War Department.

Before military organizations are granted leaves of absence it will be necessary for them to carry out the preparations for the muster out, so far as it relates to the inspection and correction of records, inspection and transfer of such public property as may be no longer required, the preparation and comparison of property returns, the securing of certificates of non-indebtedness and the return of absentees. During the time that the volunteers are away on furlough they will be paid in full, with the addition of twenty-five cents per day per man in lieu of rations. This is virtually a vacation that Uncle Sam gives his boys, to show his appreciation of their loyalty and hard work.

At the end of their respective leaves of absence all officers and men are expected to return to their State rendezvous where the final work of mustering them out will be done. Any officer or man failing to report there will be considered a de-

serter. Sickness is the only excuse that will be allowed a soldier for not appearing at the appointed time. If for any reason anyone of the rank and file absent on leave is unable to rejoin his command, a full report of the facts must be made to the adjutant-general of the army for further orders.

Officers of the regular army are entrusted with the work of mustering out the volunteers, usually one to each regiment or other organization. Men are detailed from each company to assist them in the work of transferring government property, preparing physical record blanks, correcting and completing the organization records, statements of charges and muster-out rolls.

Officers who were at any time responsible for public property of any description must obtain certificates of non-indebtedness before their final payment can be made.

Orders have been issued to the commanding officers of regiments that are to be mustered out to forward a complete list of all the officers of their respective commands to the paymaster-general, quartermaster-general, commissary-general of subsistence, surgeon-general, chief of engineers, chief of ordnance and chief signal officer, who are, or at any time have been, responsible for public property. This will enable each department to check up and ascertain the correctness of individial reports. From these corrected returns the paymaster-general will be able to decide the amount of money due each officer.

Under the supervision of the mustering officers five muster-out rolls will be prepared by commanding officers. Every man in the different organizations must appear on the rolls of the muster out. As soon as these duplicate rolls are completed they will be examined by a board of officers, to be appointed by the commanding officer. A full comparison will be made to bring about absolute correctness.

Honorable discharge certificates will be filled out for every officer and man, present or absent, except those held in service by proper authority and deserters. These certificates will be signed by the regimental commanding officer for the field, staff and band, and by company commanders for their com-

panies. At the time of departure all discharges will be countersigned by the mustering officer. Finally, these papers will be stamped and signed by the paymaster and returned to the regimental and company commanders for final distribution.

Enlisted men absent on account of sickness, who are unable to join their command, will be taken care of. Their discharge papers, with carefully-prepared descriptive lists of pay and clothing accounts, giving the address of the soldier, will be sent to the proper officer, and the former will be notified to apply by letter to the paymaster-general for final payment.

When soldiers are absent on detached service descriptive lists will be sent to officers under whom they are serving, and when such men are to be mustered out the proper officers will prepare and sign discharge certificates. Officers absent from any cause will be furnished discharge certificates, and will be notified to apply to the paymaster-general for certificates of non-indebtedness and settlement of their accounts.

Every other detail having been completed, a physical examination of all the officers and men to be discharged will be made by a medical officer of the regular or volunteer army. This will be done to facilitate the settlement of pension claims on account of disability incurred in the United States service and to protect the rights of the men who may be entitled to the benefits of the pension laws, as well as to guard the interests of the government. This examination will not extend to general officers and officers of the general staff.

Any soldier who claims to have a disability of which the medical officer can find no evidence will not receive his discharge until a board consisting of three medical officers, convened by the adjutant-general, has thoroughly examined him. If these three fail to agree a separate minority report will be required of the dissenting officer.

After the physical examinations have been completed all regimental and company records and the colors will be packed and shipped to the adjutant-general, and the ordnance and other public property in possession of the organization will be turned over to the officers of the several supply depart-

ments of the army. Then the men will be paraded by companies, paid off and handed their discharge papers.

It has been provided that any volunteer who, upon being mustered out, wishes to keep his arms and accoutrements may do so, their value being deducted from the amount due him from the government.

CHAPTER LI.

ACCURACY OF MODERN GUNS.

AIMING A TWELVE-INCH MONSTER A MARVEL OF ENGINEERING —HOW THE RANGE IS OBTAINED.

The accuracy of modern rifled guns is one of the wonders that is appreciated by a comparatively few persons. It can be readily appreciated how a man with a small rifle can become an expert marksman, but to shoot accurately with a big six, eight or 12-inch gun is a marvel of modern engineering. Accuracy with big guns is comparatively modern. In days gone by, when in a naval conflict broadsides were poured at the enemy, it was not so much due to the sure eye of the gunner as it was to luck. Of recent years, however, the gunners on board naval vessels have been aided by a scientific device known as a range-finder.

Lieutenant Fiske, of the United States navy, invented the first and best device of this kind known. It is based on the principle of land surveying with a transit and engineering chain. If a surveying party comes to a broad river whose width has to be determined, a base line is measured along the bank, and the angles which this line makes with a mark on the opposite bank are measured by the transit. Then, knowing the length of the base line and the two angles, the distance across the river can be determined by trigonometry.

Applying this to the range-finder, a base line is carefully measured between two points near opposite ends of the ship, and over each point a range-finder, answering to the engineer's transit, is permanently set up. If the telescopes of the two finders are simultaneously converged upon the same point on a distant object (ship, fortress or city) the observers will be in possession of the trigonometrical data necessary to

compute the distance, namely, the base and the two base angles.

In the din, hurry and slaughter of a sea fight, however, it would be difficult to make the necessary calculations, as the distance between the ships, and therefore the observed angles, keeps changing, and in order to make the determination of the distance automatic Lieutenant Fiske placed his telescopes in the circuit of a Wheatstone bridge and caused their change of position to record the distance of the object on the graduated scale of a delicate galvanometer. All that was now necessary was for the observers at the two range-finders to keep the cross-hairs of the telescope upon the same point of the ship, and the electric current translated, as it were, the angles into distances and recorded them by the movement of a needle over an arc graduated into hundreds and thousands of yards.

In a recent test made with two shots it was found that both projectiles fell within thirty yards of each other after traveling a distance of twelve miles.

Gun drill aboard a man-of-war involves the handling of the large guns or cannon, whether on broadside or in turret. Each of these class of guns have a crew. The number comprising the same varies according to the size and kind of guns they are to man. However, in a broadside rapid-fire gun using a projectile weighing seven pounds five men are the usual number. They are designated alongside of the piece according to their requirements in handling the gun. In the small pieces the crew in answering to their names when assembled respond to No. 1, captain and loader; No. 2, sponger; No. 3, shellman; No. 4, checkman; No. 5, powder-man. At the primary order "Let loose and provide!" the gun cover is removed, the firing apparatus adjusted, a box containing the necessary implements laid upon the deck at the rear and left of the gun mount—in fact, everything is prepared in readiness to proceed with the drill, which continues with the order "Sponge!" The mechanism is thrown open and that and the bore of the piece carefully sponged out. "Load" follows. The powder-man passes the projectile, which resembles a huge cartridge, to the loader, and then closes the breech. At the order "Point!"

the gun is elevated and trained or depressed so many degrees, according to the distance and location of the object to be fired upon as calculated by the range-finder. Its checkman then locks the gun at the next position ordered. "Ready!" is the next and cautionary order, and then men stand aside awaiting the command "Fire!" When it is given either the officer in charge or the gun-captain, with his shoulder pressed against the firing elbow and his finger touching the trigger, discharges the gun and the projectile, with a humming sound, takes flight on its errand of destruction or instruction, whichever the case may be.

CHAPTER LII.

ROCKET TORPEDO GUN.

MOST DESTRUCTIVE IMPLEMENTS OF NAVAL WAR—REAR-ADMIRAL HOWELL HAS MADE SOME EXPERIMENTS THAT MAY SOON BE TESTED—EFFECTS OF A "SURE SHOT" ON A MODERN WARSHIP.

The awful destruction of the battleship Maine by means of high explosives is destined to have an important influence in naval warfare. The lesson that it teaches will stimulate active experiment in new fields, which must result in important inventions of new death-dealing instruments. That gunpowder has reached the greatest limit of its possibilities must be accepted, and the advancement of engines of war in the future must be along the line of high explosives. How to use them with safety and accuracy is the question.

The guns of the Vesuvius type have not fulfilled the requirements by a great deal. The Sims-Dudley dynamite gun, though an advance, has not answered the purpose. The problem still remains to be settled. The friends of the new gun which is building at the Driggs-Seabury Gun & Ammunition Co. claim that it will accomplish the two ends. Its tests as soon as it can be completed will be followed with great interest. The gun is the invention of Rear-Admiral J. A. Howell, of the United States navy, whose automobile torpedo was so effective, and his name in conjunction with it certainly insures a measure of success.

Rear-Admiral Howell has been conducting experiments for several years to improve the Vesuvius' guns and obviate the difficulties which they present. He believes that the only means by which a safe, accurate and effective gun can be secured is by embodying in the projectile the two-fold character

of piece and projectile; that is, to have it receive impulse from forces residing within itself. Upon these lines he has worked until he has evolved a gun which will speed a rocket containing the explosive with the accuracy of a rifle ball. He believed the rocket must be made to revolve with the same rotary motion of a steel projectile hurled from an ordinary gun. To do this the enormous pressure of twenty tons to a square inch would be required in an ordinary gun. Such a force would detonate any mass of high explosive at the instant of discharge. He therefore conceived the idea of revolving both the gun and the charge. The projectile, consisting, in the 10-inch caliber, of 100 pounds of gun-cotton, is encased in a thin metal envelope, the rear end of which contains rocket composition and the head of a percussion fuse, which is set in action by the force of the impact. This is placed in the gun, and when, by a mechanical contrivance, it has been spun up to 2500 revolutions per minute, a friction cap ignites the rocket composition, and the banked-up pressure at the base starts the rocket. This, then, begins its flight with a rotary motion corresponding to that of the gun. The fact that this motion is due to neither the resistance of the atmosphere against vanes nor to the escape of a part of the propelling gas from a number of vents, gives it great range, velocity and, above all, perfect accuracy, while the absence of any initial shock of discharge renders it absolutely safe.

The heaviest war rocket fired from the new Howell gun will weigh 300 pounds, the range will be about 3000 yards, and its accuracy almost equal to that of a rifle projectile. The piece, though it cannot be called a high-angle-fire gun, nor one of point-blank range, is between the mortar and the rifle. The new gun can be used in both offensive and defensive operations, ashore or afloat.

The enemy is supposed to have been one of a large fleet that has engaged the Sandy Hook batteries, and, either through the smoke and confusion of battle, or some other chance of war, has succeeded in passing the fort, clearing the channel of torpedoes by countermining, and is speeding for the Narrows, from which point she expects to make of New

York a mass of smoking ruins. She has not reckoned well, however, for, owing to great drafts of water, the battleship is compelled to follow the tortuous main ship channel, which brings her within range of the new weapons of destruction mounted on the point at Coney Island.

The decks of the enemy are cleared to fight the forts that mark the harbor entrance, for the insignificant little pieces on the white sands of New York's pleasure ground have not engaged the serious attention of the commander. The great guns of his main battery, though pointed in that direction, have not deemed them worthy of a single broadside. This he reserves for the more difficult task of silencing the forts of the Narrows. A report little louder than that of a toy pistol, however, at last attracts his attention—and, before he has time to reply with even one of his rapid-fire guns, a number of steel cylinders are hissing and sputtering through the smoky atmosphere. With accelerating velocity they rise as high as the foremast-head, then turn their noses downward, and, with unerring aim, one of them crashes into his starboard side forward, tearing away the armored plates and leaving a hole through which rush the waters of the bay. Another falls a little astern, too far away to do its work of destruction, though the concussion shakes the ponderous fighting machine from stem to stern, disables her steering gear and puts her engines out of line. The guns from the forts at the Narrows now open fire at long range, and after a few well-directed shots a white flag is seen floating at the masthead—and New York is saved.

The new gun may be briefly described as follows:

The field piece consists of a cylindrical tube forming the main body, which is separate from the part containing the breech. The gun is supported by steel framework, the rear end of which carries the breech portion, and the front forms the forward half of the muzzle ball bearings, the other half consisting of a ring shrunk upon the main tube near the muzzle. Since the bore is perfectly concentric with the breech cavity, the gun can be loaded without absolutely bringing the main tube to rest.

In this type the gun is rotated by means of gear and sprocket wheels—similar to those on the bicycle for multiplying speed and transmitting power. A small bevel gear, which surrounds the gun, engages a larger one mounted on the trunnions. This large wheel carries on its shaft a small sprocket, to which it is keyed. A sprocket chain leads from this to a large sprocket wheel mounted on the trail. The latter wheel may be revolved either by hand or foot-power, depending upon the size of the gun.

The speed is so multiplied, through this system of sprocket chain and gears, that a velocity of 1200 revolutions per minute is imparted to the gun.

Owing to there being practically no pressure in the tube there is no recoil, and, therefore, the carriage remains in position. The elimination of the strain due to recoil permits of an extremely light carriage, the weight of the 3.5-inch field gun and carriage complete being under 400 pounds. The breech mechanism is extremely simple and of the interrupted screw type. A copper gas check is provided, which takes the place of the brass carriage-case in rapid-fire guns, or the De Bange gas check in larger pieces, which prevents the escape of gas into the breech mechanism.

The firing of the gun is readily accomplished as follows: The breech-block is first opened and the projectile inserted. It is then closed and the primer attached. The gun is then spun up, and when revolving rapidly enough and pointed at the target the lanyard is pulled, the primer fired, and the flame communicated to the rocket composition in the end of the projectile. A certain amount of gas is allowed to escape around the rocket, so that no more pressure will be banked up than is sufficient to give the projectile a good start. After leaving the muzzle the burning of the rocket composition increases the density of the gas, thus imparting an accelerating velocity.

In the larger gun, used for fortifications and on board ship, the side frame which forms the trunnions of the breech is replaced by cylindrical casing, which carries the trunnions at

its forward end. From the trunnions the construction is similar to that of the field piece. The breech mechanism and method of loading are practically the same. The transmission of the power, however, and the multiplication of the speed are quite different.

CHAPTER LIII.

BIG COAST DEFENSE GUNS.

HOW THE GREAT DEATH-DEALING MACHINES ARE LOADED AND FIRED—MECHANISM OF THE DISAPPEARING AND DYNAMITE GUNS AND THE BIG MORTARS DESCRIBED.

Of the many notable achievements which have in recent times crowned American ingenuity and enterprise, none are more praiseworthy than the invention and perfection of the ponderous guns which not only constitute the paramount feature in the armament of the nation's warships, but likewise stand in readiness to dispute the entrance of hostile vessels into any harbor of importance on either of her extensive seaboards.

The matter of providing adequate protection to points along her sea and gulf coasts, which were repeatedly pronounced vulnerable by military experts, was for many years, through legislative contention, subjected to protracted delay. The importance of that protection and the perilousness of its procrastination is amply appreciated after a moment's reflection upon the suddenness which marked the precipitation of the present international conflict. However, when the construction of fortifications was finally inaugurated, the rapidity and thoroughness which characterized the progress of the undertaking was nothing short of phenomenal, and today the people rest secure in the knowledge that their coast is guarded by a system of defenses unsurpassed throughout the world.

The guns which are depended upon to repel any attack upon the coast cities are of a most formidable character, and represent three distinct types, viz., the 8, 10 and 12-inch, breech-loading, steel rifle, the 12-inch breech-loading steel-rifled mortar, and 15-inch breech-loading pneumatic dynamite gun.

The 12-inch rifle, which, by reason of its extensive range and

great penetration, is considered the most effective, and, therefore, most important of the coast defense guns, is 37 feet in length and weighs forty-five tons. The fixed charge is 425 pounds of brown prismatic powder, which will throw a steel armor-piercing projectile weighing 850 pounds over a space of twelve miles. The velocity given this death-dealing missile is 2100 feet per second and with an initial energy of 26,000 foot tons.

The distance at which such a shot can be fired with accuracy at an object the size of a warship depends upon the range of vision, which, through telescopic sights and under the most favorable circumstances, is about eight miles. At the shorter range of two miles some marvelous feats in marksmanship have been accomplished. As an instance, one of the guns at Sandy Hook was discharged at a target two feet in diameter, the huge projectile piercing the center of the bull's-eye. The position of the gun was then altered, aimed anew, and two more shots fired, each passing directly through the aperture made by the first.

The superior advantage possessed by a heavy gun mounted on shore over one of the same caliber on a war vessel is demonstrated by the fact that the latter will carry but two-thirds the distance of the former. This is owing to the greater elevation that can be given the harbor defense gun as compared with that of the warship, the latter admitting of adjustment to but a comparatively slight angle, for the reason that, should its breech be depressed to the same degree as that of the shore gun, the force of its recoil would send it crashing through the decks of the staunchest vessel afloat.

The carriages upon which the shore guns are mounted are somewhat varied as to mechanism, the two most distinct patterns being the barbette and the disappearing carriages. The former consists of a massive base ring supporting the heavy metal frame, and operated by means of rollers upon a circular track. So ingeniously are the bearings and levers arranged that one man can readily manipulate the ponderous mass of steel, depressing or elevating the huge breech at any angle and swinging the whole great contrivance through an arc

of 270 degrees. The gun proper rests in a seating of gun metal, to which it is securely strapped by means of broad steel bands. The seating is so designed as to slide backward and forward upon the flanged surface of the steel frame, to which it is confined by long, cylindrical buffers attached to the trunnions on either side. These buffers are for the purpose of taking up the recoil of the gun after firing, by means of heavy steel springs coiled inside. In some instances the buffer is filled with water or glycerine, and works upon a steel rod, extending forward from the rear end of the frame, on the same principle as a piston. Upon the discharge of the gun a relief valve in the cylinder is automatically opened, the recoil forcing the liquid contents into the forward end of the buffer, which constitutes a gradual and effective brake action. In order to again run the gun out to a firing position it is only necessary to transfer the liquid under pressure to the rear of the piston in the recoil cylinder.

The method of loading and firing a 12-inch harbor defense gun has been reduced, through the achievements in mechanical science, to an admirable state of simplicity. The breech mechanism consists mainly of a solid steel plug, constructed on the principle of an interrupted screw, its threads, as well as those of the interior of the breech, being bisected at three intervals by broad channels cut into the metal parallel with the axis of the breech block. Attached to the outer edge of the chase rim, and extending across the lower portion of the breech, is an automatic swinging tray for supporting the plug upon its being withdrawn. This is accomplished by means of a single crank extending from the side of the chase rim, and upon turning which the plug is revolved one-sixth of a turn, throwing the threads out of connection and allowing it to slide outward through the channels. Upon its leaving the breech, the weight of the plug is taken by the tray, which, by a few additional revolutions of the crank, is swung to one side and the gun is ready for loading.

The task of lifting a projectile weighing nearly half a ton would, at a casual glance, appear in itself no small undertaking, and the readiness and ease with which it is raised by means

of the hydraulic elevating apparatus is only another illustration of the marvelous ingenuity and perfection exhibited in all the details combined in modern gunnery. When lifted to its position opposite the breech opening the projectile is thrust into the chamber by means of a hydraulic or electric rammer, situated at a distance of five feet to the rear of the gun. This rammer is operated simultaneously with the elevating apparatus, the speed of the latter being six times that of the former, so that by the time the projectile is raised to its required position the rammer is directly behind it, and a second later has pushed it home.

Upon withdrawing the rammer the two sections of powder are raised and inserted behind the shot, after which the action of the crank shaft is reversed and the plug swung into place, thrust into the breech and locked. The firing attachment, consisting of a friction fuse, is then screwed into the vent, the lanyard adjusted, and the gun only remains to be sighted prior to firing. In aiming the required angle is secured by turning the elevating wheels, which action raises or depresses the breech as desired. The sights are, as a rule, attached to one side of the gun, near the trunnions, and are combined with a system of the most delicately constructed telescopic lenses, which enable the gunner to draw an extremely fine bead, at a great distance, on the object aimed at. The firing is accomplished by a slight tug at the lanyard, which causes a frictional ignition of the quick fuse connected with the powder charge, and a simultaneous discharge results.

The disappearing carriage, while adapted only to guns of an inferior caliber to that just described, is nevertheless a splendid example of the advances made in the department of heavy ordnance, and is a fitting monument to the scientific knowledge and inventive genius of American military officers. In attestation to their superior merit, there is not a fortification on the United States seaboard today which is not equipped with 8 or 10-inch guns mounted upon disappearing carriages. When in a firing position these guns stand at a height of fourteen feet above the base ring, while after discharging they are

lowered by the momentum furnished by the recoil to a position less than one-half that height.

The main features of this remarkable carriage are the ponderous steel arms adjusted to either trunnion, at the lower extremities of which is secured a heavy counterpoise. To the breech of the gun is attached, by means of two smaller trunnions, a heavy steel bracket. When the gun is fired the force of the recoil causes it to describe an ellipse, and upon descending the weight of the massive chase is caught and supported by the bracket, where it is held until the reloading process is completed. The counterpoise attached to the forearms not only assists the buffers in taking up the recoil after discharging, but also greatly facilitates the return of the gun to a firing position.

Another invaluable addition to the national harbor defense system is the powerful 12-inch steel rifled mortar, which, at a range of four miles, is the most destructive fighting machine of its caliber in existence. The weight of the projectile thrown by this mortar varies from 1000 to 1200 pounds and contains 100 pounds of high explosive. The amount of powder required for a single discharge is 125 pounds. Aimed at the high angle for which it is designed, a shell can be fired from a 12-inch mortar with such accuracy and force over a four-mile range as to pierce the decks of any war vessel afloat. Moreover, the bursting charge is so minutely timed that the explosion of the shell does not transpire until it has penetrated into the interior of the vessel.

As an example of the excellent marksmanship developed by the forces manning these guns, over a range varying from four to six miles, thirteen out of twenty shots were recently dropped into an area the size and shape of a modern warship's deck, while the remaining seven struck so close that everyone of them, upon exploding, would have been destructive to a vessel. The process of loading and firing such a mortar is essentially the same as that applied to the 12-inch rifle, although the mechanism is of necessity somewhat more complicated.

Of an entirely different character from any of the other

heavy ordnance in use are the pneumatic dynamite guns. They are of two styles, and are varied as to caliber. No. 1 consists of a thin, smooth bore, cast-iron tube 15 inches in diameter, and 54 feet long, mounted at a fixed elevation of 18 degrees. In the place of gunpowder compressed air is employed in discharging the shell from this gun, the power being furnished by Norwalk compressors. The air is forced into reservoirs consisting of a number of tubes constructed of wrought iron, 16 inches in diameter, and 13-16th of an inch thick. There are two of these reservoirs, one for firing and the other for storage, the capacity of the former being 210 cubic feet and of the latter 420. The air is stored at a pressure of 2000 pounds per square inch, while the firing reservoir has a fixed pressure of 1000 pounds.

The quantity of air used at one discharge is regulated according to the extent of the range. At the distance of a mile the amount of air required is 150 pounds, and this deficit in the firing reservoir is immediately replenished from the storage supply. Two "revolvers," acting upon much the same principle as a Colt's cylinder, are placed under the breech of the gun, each of which contains five chambers for holding as many projectiles. In loading the gun the entire chase is uncoupled from the tube and dropped downward on a pivot in the extremity of the breech.

As it descends, the opening comes directly in line with the lower chamber of the first "revolver," from which, by means of a hydraulic rammer, the shell is forced back into the breech, after which the chase is swung upward and again connected with the main tube. By so doing the revolver is turned one chamber, thus placing another shell in readiness for the next loading. When the first revolver is emptied it is automatically refilled by the one in reserve. In firing the gun, a small lever is pulled, which releases the requisite amount of air to carry the shell over the desired range. Style 2 differs from the above principally in the breech mechanism, the projectile being received into the chamber through an opening in the

breech, which is closed when firing by a steel plug similar to that of the steel rifle previously described. When not in use the tube of this gun rests in a massive forestock, extending nearly its entire length, and from which it can be elevated to any desired angle.

Not the least interesting of the many peculiarities of the pneumatic gun is its projectile. The largest of these is seven feet in length by fourteen and three-fourths inches in diameter, and in shape somewhat resembles a monster arrow, having a spindle-like shaft with spiral vanes attached to the end, designed to preserve its alignment and to create a rotary motion.

The effect of a full-size projectile thrown from one of these guns is as yet only problematical, but, judging from the tests made by smaller guns of like design, the execution resulting therefrom must necessarily be appalling. As an instance, a 50-pound shell fired from an eight-inch pneumatic gun at an old government survey schooner a mile distant resulted in her complete destruction. A more comprehensive idea as to the tremendous force that would be generated by the bursting of a shell from one of the larger patterns may be had from the opinion of torpedo experts, who have declared that the submarine explosion of the largest projectile thrown by a 15-inch pneumatic gun would wreck a warship upward of twenty feet distant from the spot.

With such admirable defensive facilities at her command the United States need have but little fear of any molestation of her coast cities by a foreign foe. Yet, invincible as her harbor batteries are at the present day, the time is not far distant when their strength will be doubly augmented.

There is at present under construction and rapidly nearing completion at the great Watervliet arsenal on the Hudson the largest coast-defense gun in existence. It is known as the 16-inch Flagler rifle, and when completed will be forty-nine feet in length, with a gross weight of 126 tons. This stupendous engine of war will consume at a single discharge 1000 pounds of prismatic powder, and will hurl a steel projectile six feet in length and weighing 2350 pounds a distance of fifteen miles.

It is quite safe to predict that the distribution of a few of these slumbering volcanoes along the Atlantic, the Pacific and the Gulf coasts will insure peace to these United States in their immediate vicinity for several generations to come.

CHAPTER LIV.

MINING THE HARBOR.

HOW THE DEADLY EXPLOSIVES ARE PLACED AND OPERATED.

Now that everybody has heard of the mines and torpedoes placed in ship channels for the purpose of blowing up a warship whose commander is rash enough to attempt an attack, it will doubtless prove of interest to many to have the mines and the method of exploding them explained. Awful, indeed, would be the scene should these hidden explosives be fired under a hostile warship or fleet. On one side would be the gigantic power of the battleships, shrouded in smoke and shaking earth, sea and sky, with the thunder of their guns. On the other side, mystery—a power as gigantic as that of the ships, but veiled by the calm waters of the bay. Death without warning leaps up under the keels of the ships and crushes them in his terrible embrace, dragging the ruin down with him into the depths.

The human agency by which this terrible result is brought about remains wholly hidden from the hostile fleet.

WHERE THE OPERATORS ARE.

In a little secret chamber in a fort are the men who are to blow the doomed vessel or fleet into eternity. One of them sits by an instrument that has keys like a piano, or, perhaps, more like one of the modern, small telephone switchboards. Many wires run out from the keys. The other ends of the wires are under the surface of the bay.

A second operator eagerly scans a chart of the harbor. It is ruled into squares like a checker-board, and each square is numbered. Upon this chart he traces the position of the advancing ships as it is reported to him from various observa-

tion stations with which he is in telephonic and telegraphic communication. In these stations are men who operate marvelously delicate instruments called "position finders," by means of which movements and distances of the enemy's ships are always accurately known.

TOUCHING THE KEY.

Signals come and go. In the underground chamber the squares of the chart are rapidly checked off as some great battleship advances to its doom. The fatal moment comes. The operator bends forward and touches a key. Instantly a frightful waterspout leaps up around the ship. She is seen in the midst of it—distorted, unreal.

The mountain of water, with the iron mass of the battleship half hidden in it, falls slowly. The sea is furrowed by great waves, bearing a little wreckage. The operator's ear distinguishes the reverberation of the explosion amid the din of battle. A faint thrill comes to him through the earth floor of his den. It is all over. He turns again to the chart. Another ship is coming.

The present complete defense has been brought about by the assiduous efforts of the War Department. The work goes on quietly and without any more publicity than can be helped. The torpedoes are laid on in what is known as observation mines. The mines will be fired from an observation point, and will be exploded by electrical connections on shore. A vessel which finds herself over one of these mine fields at the time of explosion will be torn to pieces.

DESTRUCTION IS COMPLETE.

No craft ever built can withstand the terrific effect of 500 pounds of gun cotton exploding under her bottom. Experiments made with hulks have shown that twenty-five pounds of gun cotton has served to tear out 100 square feet of a vessel's bottom.

The torpedoes, however, are not operated singly. On the

contrary, they are arranged in groups of at least six in a group. A 500-pound gun-cotton torpedo has a destructive area of about sixty feet. The torpedoes are laid out at distances of about sixty feet apart, and a group of six would have a destructive area of 720 feet. That means that a channel 720 feet in width can be safely intrusted to the care of six torpedoes.

The torpedoes adopted by the United States are similar to the best pattern now in use in Europe. One type consists of a cylindrical case, made of 3-16 plate and a little over 32 inches in diameter and about 34 inches in depth. Eye-bolts are riveted to the top and bottom of the case for slinging it and for connecting the sinkers. Both the bottom and top of the case are fitted with lids. The gun cotton is packed in twenty-two copper cases, and these are stored in the cylinder in two tiers. Each case is fitted with rewetting holes. The center copper case has a hole in it for the reception of the primer, which serves to explode the mass. This primer is a disc of dry gun cotton, and is sufficiently powerful in its effects to explode the latent mass of wet gun cotton. Wires lead down through the lids of the cylinder and connect with the primers in the center of the copper cases. When this is done the lids are fastened down and a dome is screwed on. The greatest care has to be exercised at all stages of the work, for that little dry gun-cotton charge is so sensitive that not much coaxing is necessary to cause it to explode.

CHAPTER LV.

CONDUCT OF AN ARMY CAMP.

STUPENDOUS LABOR INVOLVED IN PROVIDING FOR TWENTY-FIVE THOUSAND MEN—SOLDIERS IN CAMP ARE LIKE THE INHABITANTS OF A CITY WHO ARE ALL DEPENDENT—EVERY MAN MUST BE FED, CLOTHED AND HOUSED LIKE SO MANY CHILDREN—HOW THIS IS DONE.

Very few people have a definite idea as to the stupendous work involved in the conduction of an army camp during time of war. It is a tremendous task, and only those identified with the army have a proper conception of the great amount of labor required. Indeed, the work is of such great immensity that officers and assistants labor incessantly from sunrise until far into the night every day, including Sundays and holidays. This is particularly true of the assistant adjutant-general's office, where the office hours begin at six o'clock and continue until almost midnight.

In the city, no matter what size, every man depends upon himself. In an army every man depends upon the officer above him. Army affairs are peculiarly those of a continuous chain, with every link dependent upon another. Like children to parents, are enlisted men to their officers, particularly in matter of dependence—so is the captain to his major, the major to his colonel, and so on from major to the major-general.

To appreciate what this dependence means is to partially realize what an undertaking is it to manage a camp of over 25,000 men. To visit the camp of an army corps, to see the thousands of tents, the hundreds of wagons, the supply stores of the commissaries and quartermasters, the cooking and baking arrangements and systematic bustle in general—to see all of this will serve to open the eyes of the average citizen,

fill him with amazement, and if a complainer, make him not a little sorry of his previous criticism.

Comparing a camp to a city of equal population gives a fair idea of the undertaking involved in its conduction, but does not do justice to the actual work of a camp, for the reasons given above, that a military camp is a continuous chain—every man dependent upon another.

The camp, if widely spread out, will cover over nine square miles; almost 8000 tents will be needed, the exact number of tents to a regiment being 359 for enlisted men, one for the colonel, one for the lieutenant-colonel, three for the battalion majors, one for the regimental surgeon, one for the regimental adjutant, one for the regimental quartermaster, one for the regimental chaplain, three for the battalion adjutants, three for the assistant surgeons, twelve for the company captains, twenty-five for the lieutenants, one for the regimental headquarters and four for officers' mess.

The teaming feature of a military camp will surprise most people. There are needed over 175 army wagons, and almost a thousand mules, necessitating almost 200 teamsters. Carriages, ambulances and signal corps conveyances are to be added to this list, making this feature of the army resemble the wagon and team feature of a circus—but minus the glitter, glare, glamor and spangles of the latter.

The sustenance feature of an army camp, known as the commissary, towards which unreasonable critics have been so severe, involves work and necessitates a system of which the public has a very faint comprehension.

There is a chief commissary officer. Under him is the chief commissary of each division, who rank as majors, and the chief commissary of each brigade, who rank as captains. Also under him is the depot commissary officer, who ranks as captain, and who, with a force of three commissary sergeants, four clerks and twelve laborers, occupies a large commissary warehouse at the railway station, where supplies are kept and distributed to the brigades.

"Feeding an army is an arduous task," said Colonel Allison, chief commissary of the Second Army Corps, "and I wish the

public only partially realized the duties incumbent upon the commissary department, especially under such circumstances as prevailed at the beginning of the war, when necessity compelled the selection of many men for the different offices of the department who had no previous experience. The result can be imagined of inexperienced men manipulating a locomotive, and so with all professions and vocations. There were few experienced men attainable, and at first there was no opportunity to school the inexperienced. I was in charge of the commissary department at Camp Alger when the newly-appointed officers began to report. They came with clerks as inexperienced as themselves, and at first things ran any way but smoothly. Perceiving the necessity, I determined to give each newly-appointed commissary officer and clerk three or four days' schooling, and the result was gratifying.

"Among the first mistakes was that of giving each company in bulk rations for ten days, and the result was that for the first several days the soldiers gorged themselves, and before the ten days were up would complain about scarcity. There were also complaints that other companies had better rations. There were, no doubt, grounds for complaints of the last-named character, but the fault rested with the officers of the companies. On hearing of such complaints, I gave instructions that each company commissary make it a special point to watch closely the portioning of the company supplies, and make certain against the company being slighted. I also cut the rations from ten days' supplies to three days' supplies, but have since increased it to five days. There is no occasion for scarcity of food in any company. More than enough is provided, and, in fact, more than each man can eat. The army ration, as provided by the United States Government, is the result of years of test and study, and exceeds in every respect the army rations of any other nation on earth.

"The greatest trouble ofttimes rests with the companies themselves. For instance, the beef for the camps comes in refrigerator cars, and the hours for delivery to the commissary officers are from five o'clock to ten o'clock A. M., so as to

keep the cars closed during the heat of the day. Some companies send wagons, with sacking to wrap the meat in, and when the meat reaches the company quarters it is placed in a deep hole and covered with brush, etc., to keep out warmth and light. Such companies keep their meat fresh. On the other hand, some companies have the meat hauled to them uncovered and unprotected, and leave it setting on the top of a barrel at the mercy of flies and weather."

"By recent legislation," continued Colonel Allison, "each company is entitled to an enlisted man for cook, with pay of corporal. Besides, the regulations of the army provide for the company commander to supervise the cooking and messing of his men. It is his duty to see that the company is provided with at least two copies of a manual expressly prepared for army cooks, and it is his further duty to see that the necessary utensils in serviceable condition are always on hand. It is a strict order that the company kitchen be kept clean, and that no one be allowed to visit or remain in the kitchen except those who have business there. It is also ordered that the greatest care be observed in cleaning and scouring cooking utensils.

"The rations of flour per man is eighteen ounces, but when made into bread it amounts to considerably more than eighteen ounces. In fact, 6000 ounces of flour, by bakery arrangements here, makes 9000 ounces of bread. This extra 3000 is a saving of that much to the men, and they are so credited. A corps bakery is conducted here, with Charles Suehle as foreman, and a fine quality of bread is turned out. Mr. Suehle has thirty assistants, twenty of whom are enlisted men. The present capacity is 8000 loaves daily, but this will shortly be increased to 34,000 loaves daily—thirty-four ovens, with a capacity of 1000 loaves each.

"The saving to the troops by this arrangement is about 33 per cent., which is disposed of to their benefit or credited to the company fund."

The following is a list of articles composing the ration for troops as furnished by Colonel Allison:

Articles.	Quantities per ration—Ounces.
Fresh beef	20
Or fresh mutton, when the cost does not exceed that of beef	20
Or pork	12
Or bacon	12
Or salt beef	22
Or when meat cannot be furnished—	
Dried fish	14
Or pickled fish	18
Or fresh fish	18
Bread components—	
Flour	18
Or soft bread	18
Or hard bread	16
Or corn meal	20
Baking powder for troops in the field, when necessary to enable them to bake their own bread	16-25
Vegetable components—	
Beans	2 2-5
Or peas	2 2-5
Or rice	1 3-5
Or hominy	1 3-5
Potatoes	16
Or potatoes, 12 4-5 ounces, and onions, 3 1-5 ounces	16
Or potatoes, 11 1-5 ounces, and canned tomatoes, 4 4-5 ounces; or 4 4-5 ounces of other fresh vegetables, not canned, when they can be obtained in the vicinity of the post or transported in a wholesome condition from a distance	16
Coffee and sugar components—	
Coffee—Green	1 3-5
Or roasted coffee	1 7-25
Or tea, green or black	8-25
Sugar	2 2-3

	Gills.
Or molasses	16-25
Or cane syrup	16-25
Seasoning components—	
Vinegar	8-25
	Ounces.
Salt	16-25
Pepper—Black	1-25
Soap and candle components—	
Soap	16-25
Candles (when illuminating oil is not furnished by the quartermaster's department)	6-25

The department of the chief quartermaster is one involving great labor, care and judgment. Colonel Howard is chief quartermaster, and subordinate officers of the department extend through divisions, brigades, regiments to companies. The department supplies the clothing, etc., to the enlisted men, also transportation; has charge of teamsters, teams, wagons, conveyances and tents and scores of other things of like nature.

The chief engineer has ten assistants and a clerk. The department is an important one, and the work consists of laying out roads, constructing bridges, planning camps, etc.

The hospital department is an important one, and a large force of surgeons is kept busy. The work is conducted systematically to a marked degree. Much of the illness results from carelessness on the part of the soldiers themselves. Many of them disregard the imperative rules of health and hygiene, and some are extremely indiscreet in one respect, in particular, that of overeating or dissipation when away from camp. But illness can no more be checked in a military camp than in a town or city. Typhoid and other fevers and dysentery prevail in spite of every possible sanitary precaution, and even at the hospital wards surgeons themselves have suffered from dysentery.

Every morning there is a thorough cleaning up and the strictest rules are enforced. The premises of the wealthiest city resident are not cleaner kept. The company commanders